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Strait of Georgia Sport Fishery Creel Survey Statistics for Salmon and Groundfish, 1988

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by

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ABSTRACT

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Catch and effort statistics for the Strait of Georgia tidal sport fishery are presented for each month in 1988. The statistics were derived by combining the data from nearly 34,000 interviews and 68 aerial surveys. Estimates were provided for the number of sport fishing boat trips and the catches of chinook, coho, pink, sockeye and chum salmon along with rockfish, lingcod, dogfish and other finfish. Also given are numbers of marked (adipose fin-clipped) and unmarked chinook and coho examined during the creel survey, and the age composition and length distribution of chinook catches. The appendix includes all catch and effort statistics for each combination of month and Statistical Area.

Keywords: salmon, groundfish, creel survey, sport fishing, catch, effort, age composition, length distribution.

RÉSUMÉ

Shardlow, T. F. and L. D. Collicutt. 1989. Strait of Georgia sport fishery creel survey statistics for salmon and groundfish, 1988. Can. MS Rep. Fish. Aquat. Sci. 2036:63 p.

Les statistiques relatives aux prises et a l'effort de pêche de la pêche sportive de la zone tidale du détroit de Géorgie sont présentées pour chaque mois de 1988. Ces valeurs ont été obtenues en réunissant les données de plus de 34,000 entrevues et 68 relevés aériens. On y trouve les estimations du nombre de sorties des bateaux de pêche sportive et des prises de saumons quinnat, coho, rose, rouge et kéta, en plus de celles de scorpènes, d'ophiodon, d'aiguillat et d'autres poissons. Le nombre de saumons quinnat et coho marqués (coupe de la nageoire adipeuse) et non marqués examinés au cours des relevés des prises et la composition par âges et la distribution par longueur des prises de saumon quinnat sont aussi présentés. On trouve aussi en appendice toutes les statistiques relatives aux prises et à l'effort de pêche pour chaque mois et combination de zones statistiques.

Mots clés: saumon, poisson de fond, releve des prises, pêche sportive, prises, effort de pêche, composition par âges, distribution par longueur.

1.0 INTRODUCTION

This report documents the 1988 catch and effort statistics for the Strait of Georgia sport fishery and discusses methodology for collecting these data. During the 1970s, the sport fishery grew to be the largest harvester of chinook and coho salmon in the Strait of Georgia. Figure 1 and Table 1 show historical catch statistics for the Strait of Georgia sport fishery for the period 1960-1988. Prior to 1980, fisheries managers recognized the need for accurate catch statistics. In 1980, the Strait of Georgia Creel Survey Program was initiated to meet the need for accurate and timely sport catch statistics primarily for chinook and coho. Since then, the objectives of the Creel Survey Program have been expanded to provide accurate estimates of all major sport-caught finfish, and age and length composition of chinook catches. This report is one of a series of Strait of Georgia Creel Survey Reports which document annual creel survey activities and estimation procedures, and provide official published Strait of Georgia tidal sport fishery catch statistics.

In 1988 the creel survey gathered a comprehensive set of annual sport fishing data for Strait of Georgia. There were no project interruptions, and interview and overflight data were collected on a continuous basis throughout the year.

In this report, all figures, tables and appendices are located at the end of text.

2.0 METHODS

The Strait of Georgia Creel Survey is comprised of two independent surveys: angler interviews and aerial overflights. Angler interviews provide data on sport fishing catch per unit effort (CPE) and daily activity patterns. Aerial overflights provide estimates of the total sport fishing effort in the study area at the time of the aerial survey. These data are combined to provide monthly estimates of total sport fishing effort and total catch of salmon and groundfish in the sport fishery. In its simplest form, the estimated total catch is calculated by multiplying estimated total effort by catch per unit effort.

The design of the Strait of Georgia Creel Survey conducted in 1988 was similar to that used in past years. Sampling was conducted during each month of the year and estimates were produced for 10 time periods. January and February data were grouped together, as were November and December data because of reduced fishing activity and sampling in these winter months. Mid-week days and weekend days were considered independently because sport fishing activity is known to be quite different between the two types of days. The Strait of Georgia study area was also stratified by geographic region. Catch and effort statistics were produced for each of the 10

Statistical Areas within the Strait of Georgia (Areas 13 - 19A, 19 B+, 28 and 29, Fig. 2); Statistical Area 19 B+ includes the portion of Area 20 east of Sheringham Point (see Appendix C for a complete description of the study area). Data collection, entry and preliminary processing were conducted by LGL Ltd. Environmental Research Associates. Estimation of catch and effort statistics was conducted by the Department of Fisheries and Oceans.

2.1 FIELD SURVEYS

2.11 Angler Interviews

Sport fishermen were interviewed at the end of their fishing trip to determine time spent fishing, locations fished and catch of each species on the trip. Demographic information was also collected during each interview. Figure 3 shows the interview form used in 1988.

Interviewers trained in fish identification inspected each boating party's catch. Unlike other methods of collecting sport fishery information, such as mail-in or telephone surveys, there was little memory-related recall bias, non-response bias, and fish identification concern with this approach to determining sport fishery catch. Landed chinook and coho were checked for a missing adipose fin which indicates the presence of a coded wire tag embedded in the fish nose cartilage. In addition, scale samples for age determination and measurements for nose-fork length were taken during every sampling shift in the winter and every other shift in the summer. Five scales were removed from the INPFC (International North Pacific Fisheries Commission) preferred area of each biosampled chinook (Mosher 1968).

The interviews were conducted at 38 landing sites (boat ramps, marinas, or resorts, Fig. 2) representative of sport fishing activity in each Statistical Area. The number of sites selected in each area was dictated by targets of desired precision and number of surveyors available. For each area - day type - work block stratum, sampling shifts at a site were chosen on a near random basis from the total number of shifts available. For definition of the above terms (day type, work block, shift) see Appendix A.

2.12 Aerial Overflights

Aerial surveys, conducted from float planes travelling along pre-defined routes, allowed observers to count vessels actively sport fishing throughout the Strait of Georgia. Planes flew at an altitude of 500-700 feet to facilitate a broad range of vision and still allow easy identification of vessel characteristics. Each plane carried three observers, two on the right side and one on the left, and each observer counted sport fishing boats to his/her side of the flight path. Figure 2 shows the flight paths used in 1988. The winter (October - April) flight path was slightly reduced to correspond with lower winter effort.

The flight path and time of departure were designed to cover major concentrations of sport fishing activity at peak periods. Whenever possible, the route was flown to keep most of the sport fishing boats to the right side to allow averaging of the two right side counts. To maximize precision, flying times during which fishing effort was rapidly changing were avoided. The number of overflights each month was governed by targets of desired precision and the expected number of interviews from the given number of sampling shifts (English et al. 1986). The days for overflights during a month were randomly selected for each day type.

2.2 DATA ANALYSIS

Data analysis included calculation of catch and effort statistics, calculation of variance of total fishing effort and total catch, estimation of marked chinook and coho salmon, and estimation of age composition of chinook catch. Appendix A details the methods and equations used in the above data analysis.

3.0 RESULTS

3.1 DISTRIBUTION OF SAMPLING EFFORT

Table 2 shows the number of creel survey fishing interviews conducted by month and Statistical Area in 1988, and the number of monthly overflights. A total of 33,900 interviews (27,062 fishing interviews) and 68 overflights were conducted in 1988. The monthly distribution of interviews generally reflected the monthly distribution of fishing effort (number of boat trips, Table 3) (Fig. 4). Interview effort was reduced during winter months, especially for Statistical Areas 13, 14 and 15 in the northern portion of Strait of Georgia (Table 2). The total fishing interviews represented 4.1% of the estimated total fishing effort for the entire study area (664,517 boat trips, Table 3) and ranged in each Statistical Area from a low of 1.5% of the estimated fishing effort in Area 18 to a high of 9.4% in Area 28 (Tables 2 and 4).

3.2 SPORT FISHING EFFORT AND CATCH

The 1988 Strait of Georgia sport fishing effort and catch statistics are summarized for each species by month in Table 3 and by Statistical Area in Table 4. Appendix B shows the fishing effort and catch statistics for each combination of month and Statistical Area.

Sport fishermen made 664,517 boat trips during 1988, which represents the highest level of effort recorded for this fishery to date except for 1980 (Table 1). The fishing effort followed the same general seasonal pattern as seen in previous years (Fig. 5). Effort levels climbed steadily from April, peaked in July, and declined rapidly in September and October. In 1988, however, the distribution of fishing effort was shifted slightly toward the earlier months (Fig. 5).

The total finfish sport catch in the Strait of Georgia in 1988 was estimated at 1,571,503 pieces (including steelhead and cutthroat trout, Table 3) and consisted of 79% salmon and 21% groundfish. An additional 935,330 salmon of mixed species were released by anglers (Appendix B-8). The two main catch groups are discussed below.

3.21 Salmon

Salmon sport catches in the Strait of Georgia in 1988 totalled 1,233,928 pieces (Tables 3 and 4) and consisted of 88% coho, 10% chinook, 1% pink salmon, 1% sockeye and 0.4% chum salmon.

Chinook sport catches in 1988 showed a continued decline for the fourth consecutive year, with anglers taking 119,117 fish (Tables 3 and 4), compared to 121,081 in 1987 and 181,896 in 1986 (Fig. 1, Table 1). The 1988 chinook catch was the lowest in 20 years.

It should be noted here that two new sport fishery regulations were introduced in 1988, that would influence catch levels of chinook. Effective April 1, the annual bag limit was reduced from 20 to 8 chinook. In addition, a 62 cm size limit was proposed in 1988 but was not passed as law and enforced until February 1989. Anglers were, however, asked for voluntary compliance to this new size limit during the 1988 season.

Seasonal catch efficiency for chinook showed reduced levels in 1988 compared to previous years. The months of April, May and June showed particularly depressed catch per boat trip (Fig. 7, Table 5). The decline in chinook catch and the reduced catch efficiency were probably a result of continued low abundance of this species.

As in 1987, the highest chinook catches were taken in Area 19B+ (26% of total), Area 13 (18%) and Area 14 (17%) (Table 4, Fig. 8). In some months, other Statistical Areas dominated the catch (Appendix B-3). During the summer months (May - September) in 1988, 73% of the landed chinook were taken in the northern region of Strait of Georgia - Statistical Areas 13 to 17. The opposite was true in the winter months (January - April, October - December) when 77% of the chinook catch came from the southern region - Statistical Areas 18, 19, 28 and 29. During November and December, many of the chinook came from Victoria/Sooke waters in Statistical Area 19B+.

The 1988 coho catch of 1,084,790 pieces (Tables 3 and 4) represents the highest coho catch recorded for this fishery except for 1978 (Fig. 1, Table 1). Coho catches in 1988 showed an early timing with the catch peaking in June instead of July (Fig. 9). The early catches paralleled the early fishing effort observed in 1988 (Fig 5). Coho catch success in 1988 reached a high of 2.9 fish per boat trip in April, then declined rapidly after June (Fig. 10, Table 5). As in previous years, the highest coho catches were taken in Area 14 (35%) and Area 13 (28%) (Table 4, Fig. 8).

In 1988, Strait of Georgia anglers caught approximately 9,000 pink salmon (Table 3). Significant pink catches were not expected in 1988 because pink salmon returns to Strait of Georgia rivers (primarily the Fraser River) are much lower in even numbered compared to odd numbered years. Areas 13 and 14 were responsible for 87% of the pink catch (Table 4).

The landings of other salmon consisted of an estimated 16,376 sockeye and 4,802 chum salmon (Table 3). The 1988 sockeye catch was the highest recorded to date in this growing fishery. A large portion of this catch was taken in Areas 19B+, 28 and 29 in late summer (Appendix B-5). Most of the annual catch of chum salmon (78% of total) was taken in Area 18 during November and December (Appendix B-6), and was attributed to chum runs returning to local rivers.

In addition to the above salmon species, an estimated 1,752 steelhead, cutthroat trout and unidentified salmon were caught in the Strait of Georgia in 1988, bringing the total salmonid catch to 1,235,680 pieces (Appendix B-7).

The average number of total salmon caught during each boat trip in 1988 was 1.9 (Table 5). This represents the highest catch success for salmon recorded to date, and is mostly due to the high coho catches.

In 1988 for the first time, more salmon were landed and more effort was expended in Area 14 than in any other Statistical Area (Table 4, Fig. 11); usually Area 13 had the highest fishing activity. Boaters fishing in Area 14 had an average catch of 2.5 salmon per trip. Area 13 recorded the greatest number of salmon hooked and released (280,004), with Area 14 next at 199,711 pieces (Appendix B-8). These two areas have major coho fisheries characterized by the release of many sub-legal coho.

3.22 Groundfish

While salmon accounted for the majority of the total finfish sport catch in the Strait of Georgia in 1988, the groundfish catch of 335,823 pieces made up 21% of the overall catch (Tables 3 and 4). The species composition of the groundfish catch, based on the Table 4 data, was as follows:

Groundfish species	Catch	% Of total groundfish catch	Major catch Area
Rockfish (*Sebastes* spp.)	194,735	58%	16
Lingcod (*Ophiodon elongatus*)	65,929	20%	13
Dogfish (*Squalus acanthias*)	4,114	1%	29
Other finfish (Appendix E)	71,045	21%	18
Total	335,823	100%	

The majority of the groundfish catch was taken in the summer months, reflecting the seasonal change in fishing effort (Table 3, Fig. 4). Catch by Statistical Area for rockfish was highest in Area 16 (20% of total, Table 4). Lingcod as in previous years, were caught in greatest numbers in Area 13 (34% of total), while the largest dogfish catch came from Area 29 (36% of total, Table 4). Area 18 produced the largest catch of other finfish (20%).

Rockfish species were identified for the entire survey area again in 1988 (Table 6). Applying the identification results to the 1988 rockfish catch estimates (Table 7) showed the following species dominance:

Rockfish species	Catch	% Of total rockfish catch	Major catch Area
Quillback	59,994	31%	17
Copper	39,000	20%	17, 14, 18
Yelloweye	10,614	6%	14
Black	1,231	1%	19 B+
Other	83,896	43%	16
Total	194,735	100%	

The above "other" rockfish category consisted of tiger, yellowtail, china, canary and unidentified species.

The catch success (CPE) for rockfish was relatively constant throughout the year and averaged 0.3 fish per boat trip, while the catch success for lingcod was 0.1 fish per boat trip (Table 5). The catch success for all non-salmon species and for total finfish during 1988 was 0.5 and 2.4 fish per boat trip, respectively (Table 5).

3.3 BIOLOGICAL DATA

3.31 Proportion and Catch of Marked Chinook and Coho

In 1988, 5,243 chinook and 46,553 coho were examined for adipose fin clip marks. Tables 8 and 9 show the observed numbers of marked chinook and coho respectively, by month and region. Data were presented by region since some Statistical Areas had insufficient numbers of fish examined for marks in some months, and those data were included with other Areas. Three regions were defined: the North Gulf represented by Areas 13-16; the South Gulf represented by Areas 17, 18, 28, 29 and the Saanich Inlet portion of Area 19 (Area 19A); and Victoria region represented by the remainder of Area 19 (Area 19B+) (Fig. 2).

Among chinook examined for marks, 4.0% had adipose fin clips. The largest observed proportion of chinook marks was in the South Gulf catch (0.056) and the lowest proportion in the Victoria catch (0.029) (Table 8). Among coho examined for marks, 4.8% had adipose fin clips. The largest observed proportion of coho marks was in the South Gulf catch (0.063), and the lowest proportion in the Victoria catch (0.033) (Table 9). The above distribution of tags by area was not typical. For example, the largest observed proportion of chinook marks recorded in 1988 was in the South Gulf (Table 8) instead of the North Gulf as reported in 1984 to 1987 (Shardlow and Collicutt 1989a, b, c and d). Monthly catch estimates of marked chinook and coho are shown by region in Tables 10 and 11 respectively. The seasonal recovery pattern of marked chinook and coho salmon was generally similar to that observed in previous years (Shardlow and Collicutt 1989b, c and d).

3.32 Catch-At-Age for Chinook

During 1988, 1,054 chinook biosamples were collected for age and length analysis. Table 12 shows the monthly number and percent age composition of chinook sampled for age. These data are summarized graphically in Figure 12. The monthly age proportions were applied to the estimated monthly chinook catches to provide breakdown by age group (Table 13). In 1988, the majority of chinook sport catch in the Strait of Georgia consisted of age 3 and 4 fish in near equal proportions (35.3% and 35.4% respectively), followed by age 2 (26.4%) and age 5 or older (2.8%). This catch breakdown by age group constrasts with the 1985 to 1987 catch data where the majority of chinook caught were age 3, and only a small fraction were age 2 (see below).

Catch	% Age composition of chinook				
year	2	3	4	5+	Reference
1983	57.1	25.5	14.2	3.1	Shardlow et al. (1989)
1984	21.6	67.3	9.4	1.7	Shardlow and Collicutt (1989a)
1985	6.6	70.8	20.6	2.0	Shardlow and Collicutt (1989b)
1986	10.9	44.9	40.4	3.8	Shardlow and Collicutt (1989c)
1987	7.8	62.1	25.0	5.2	Shardlow and Collicutt (1989d)
1988	26.4	35.3	35.4	2.8	This report.

The strong age 2 component in 1988 was likely a result of a strong brood year relative to the 1985 to 1987 period.

Figure 12 and Table 12 show a shift in the age composition of sampled chinook and hence of chinook catch, between the first six months and the remainder of the year. From January to June, the catch was dominated by age 3 and 4 fish. In July and August, the age 2 group strengthened and became the dominant age group for the remainder of the year. The high proportion of age 2 chinook in July to December catches was the result of age 2 recruitment to the sport fishery. Age 2 chinook generally reach the minimum legal size limit of 45 cm in July (Argue et al. 1983).

3.33 Mean Length-At-Age for Chinook

Table 14 shows the monthly mean nose-fork length at age for the 1,054 chinook for which both length and age data were available. Figure 13 shows the length frequency distribution for all the measured chinook (1,359 aged and unaged fish). The largest portion of measured chinook (370 fish or 27% of the total sample) was in the 45-54 cm length category. This is consistent with the large catch of age 2 fish (Table 13) which were found to have an annual mean length of 48.8 cm (Table 14). Of the total chinook measured in 1988, 7% were sub-legal in size (less than 45 cm) and these were landed mostly in June and July. A larger catch of sub-legal chinook could be expected in 1988 compared to 1985 to 1987 when only 2% to 3% of the captured chinook were sub-legal (Shardlow and Collicutt 1989b, c and d). This was due to the increased abundance of younger age class fish in 1988 over previous years. The largest chinook sampled (111 cm) was landed at Pedder Bay in Area 19 on August 18, 1988,and was 5 years old.

4.0 SUMMARY

A sport fishery creel survey was conducted in the Strait of Georgia in 1988 in order to estimate the catches of all the important recreational finfish species and the total sport fishing boat trips. The number of chinook and coho salmon with adipose fin clips were also estimated. These data are presented by month and Statistical Area. Monthly age and length compositions of chinook catch are also shown.

In 1988, a total of 33,900 boating parties were interviewed at 38 landing locations in the Strait of Georgia creel survey area. The 27,062 fishing interviews conducted represents approximately 4% of the total number of boat trips conducted by sport fishermen in the Strait of Georgia in 1988. A total of 68 overflights were also conducted to take "snapshot" counts of fishing effort.

In 1988, sport fishermen made an estimated 664,517 boat trips in the Strait of Georgia and landed an estimated total finfish catch of 1,572,000 pieces of which 79% were salmon and 21% were groundfish. The 1,234,000 landed salmon consisted of 1,085,000 coho, 119,000 chinook, 9,000 pink salmon, 16,000 sockeye and 5,000 chum salmon. An additional 935,000 salmon of mixed species were released by anglers.

The 336,000 landed groundfish consisted of 195,000 rockfish, 66,000 lingcod, 4,000 dogfish and 71,000 other finfish. Rockfish catches were identified as quillback (31% of rockfish catch), copper (20%), yelloweye (6%), and black (1%); the remaining 43% of the rockfish catch consisted of tiger, yellowtail, china, canary and unidentified species.

Catch success per boat trip averaged 1.9 salmon (all species) and 0.5 groundfish.

Among salmon examined for marks, 3.8% of chinook and 5.0% of coho had adipose fin clips. The majority of chinook sport catch in 1988 consisted of age 3 and 4 fish (35.3% and 35.4% respectively), followed by age 2 (26.4%) and age 5 or older (2.8%). Of the total chinook measured in 1988, 7% were sub-legal in size (less than 45 cm).

5.0 ACKNOWLEDGMENTS

The authors wish to thank Tom Hoyt and Carmen McConnell for their contribution to creel survey operations. We acknowledge the substantial contribution of the creel survey staff of LGL Limited environmental research associates, particularly Karl English, Jill Peterson, Mike Blazecka and Gary Searing. We are grateful to private marina and boat ramp owners for their valuable assistance and cooperation and to the thousands of anglers who participated in the survey. We also thank Alice Fedorenko for editing the report and preparing it for publication, and the DFO Word Processing Unit for typing the drafts.

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FIGURES

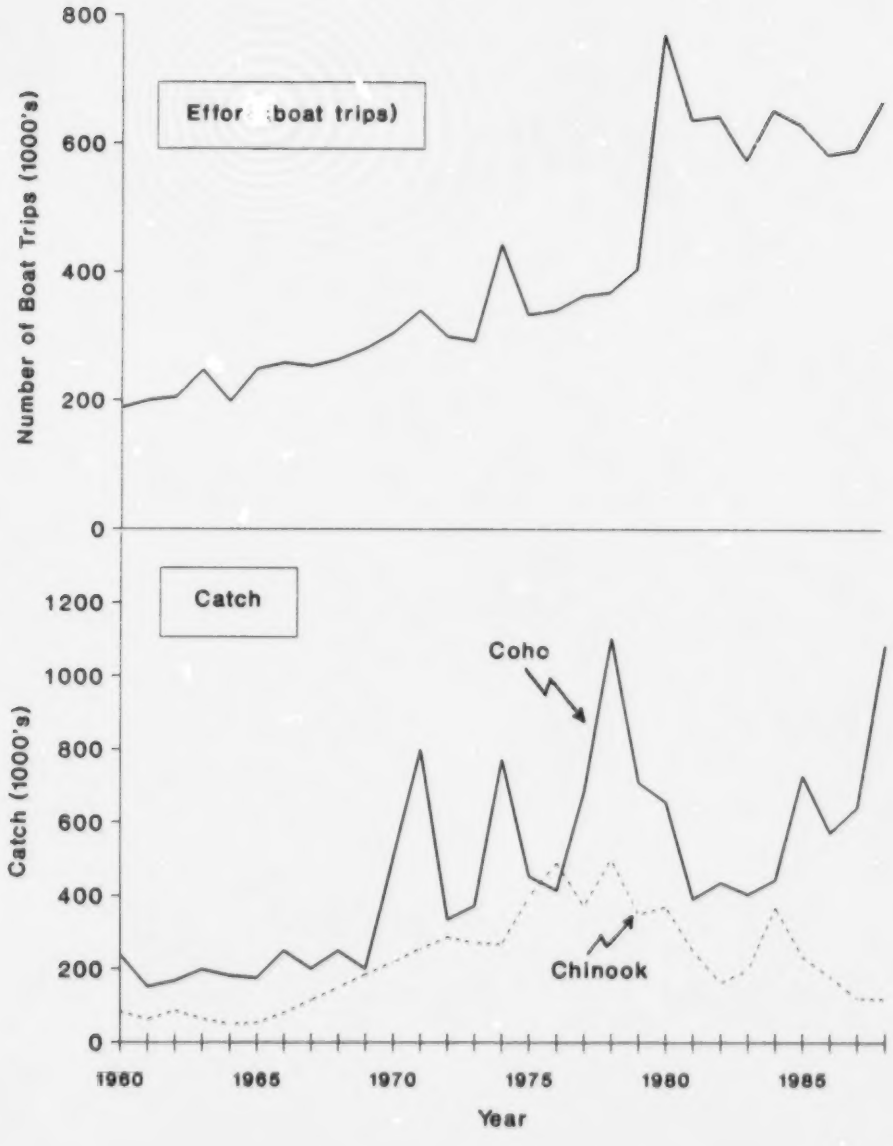

Figure 1. Tidal effort statistics and sport catches of coho and chinook salmon for the Strait of Georgia, 1960 - 1988.

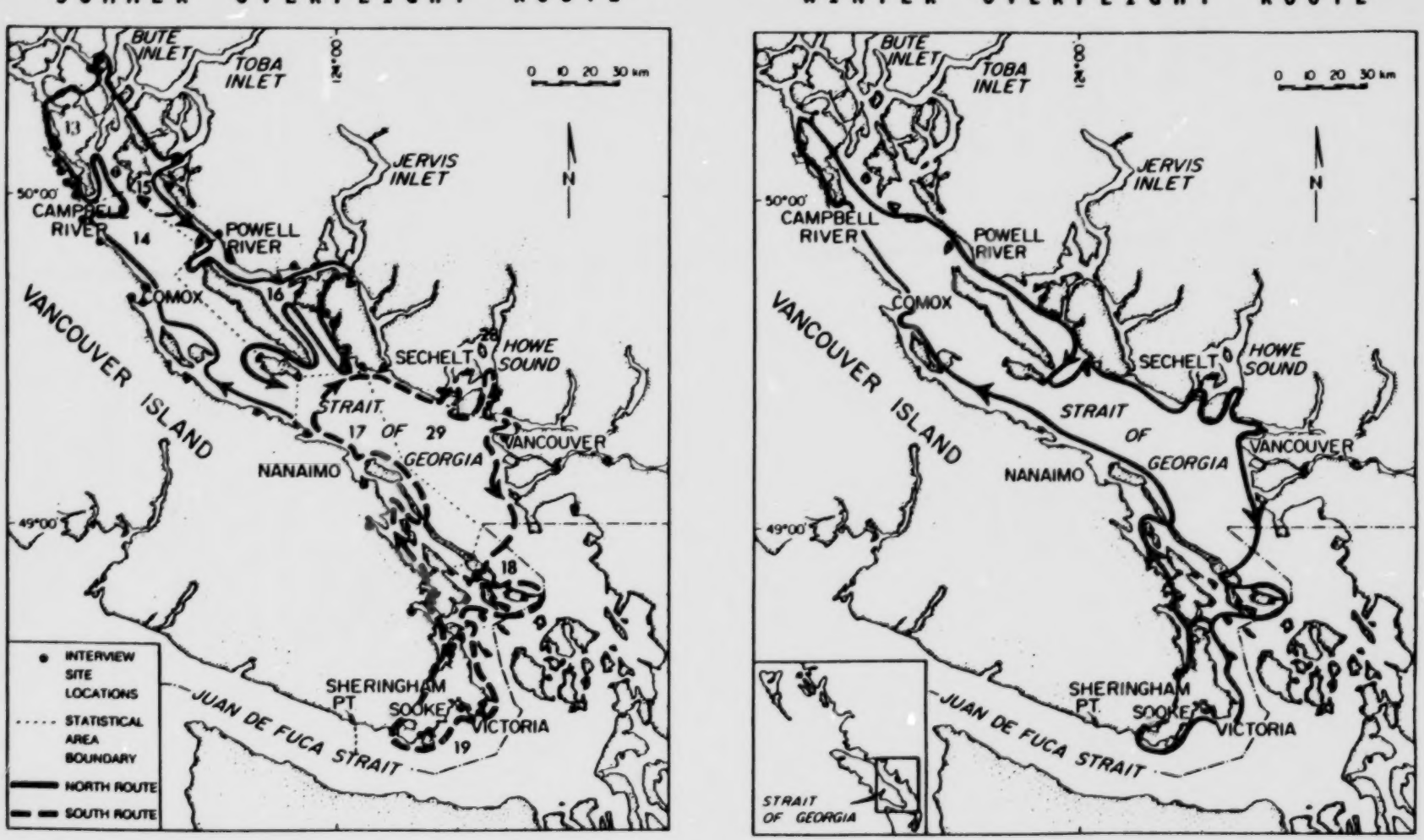

Figure 2. Interview site locations, and summer and winter overflight routes, Strait of Georgia, 1988.

STRAIT OF GEORGIA SPORT FISHING CREEL SURVEY N° 31530

Landing Area: _____/_____ Statistical Area: _____

Interviewer: _____/_____ Date: ___/___/___ (YR MO DAY) Time of interview ____:____ AM PM

PRESENT BOAT TRIP COMPLETED

1. Total number of individuals in party: ☐

2. Time of landing: ____:____ AM PM Time block: ☐

3. Was your party sport fishing on this trip: YES NO

4. Guided: YES NO

Assessment Code ☐
0 = Complete Form
1 = Marks Incomplete
3 = Not Visually Inspected
4 = Refusal

5. Residences of Party: B.C. ☐ Rest of Canada ☐ Other ☐

6. Length of boat trip: ☐ HRS.

7. Times lines were in the water: (EXCLUDE time not fishing)

AM			PM	
☐ (1) before 7:00	☐ (5) 10:00-10:59	☐ (9) 2:00-2:59		☐ (13) 6:00-6:59
☐ (2) 7:00-7:59	☐ (6) 11:00-11:59	☐ (10) 3:00-3:59		☐ (14) 7:00-7:59
☐ (3) 8:00-8:59	☐ (7) 12:00-12:59	☐ (11) 4:00-4:59		☐ 15) 8:00-8:59
☐ (4) 9:00-9:59	☐ (8) 1:00- 1:59	☐ (12) 5:00-5:59		☐ (16) 9:00-plus

8. Average number of lines in the water for TOTAL boat party: ☐

9. CATCH SUMMARY

Total catch for trip: ☐

Total time fishing: ☐ HRS.

	1ST SUB AREA	2ND SUB AREA	3RD SUB AREA
GO TO MAP:			
KEPT:			
RELEASED:			
TIME:	HRS.	HRS.	HRS.

MARKS

	ADIPOSE MISSING	UNMARKED
CHINOOK	☐	☐
COHO	☐	☐

10. How much fishing time was directed at each of the following?

CO ☐ CN ☐ SM ☐ LC ☐ RF ☐

GF ☐ SF ☐ OTHER ☐

11. Angler salmon species identification:

COHO	CHINOOK	PINK	SOCKEYE
☐	☐	☐	☐

Figure 3. Sample of 1988 interview form.

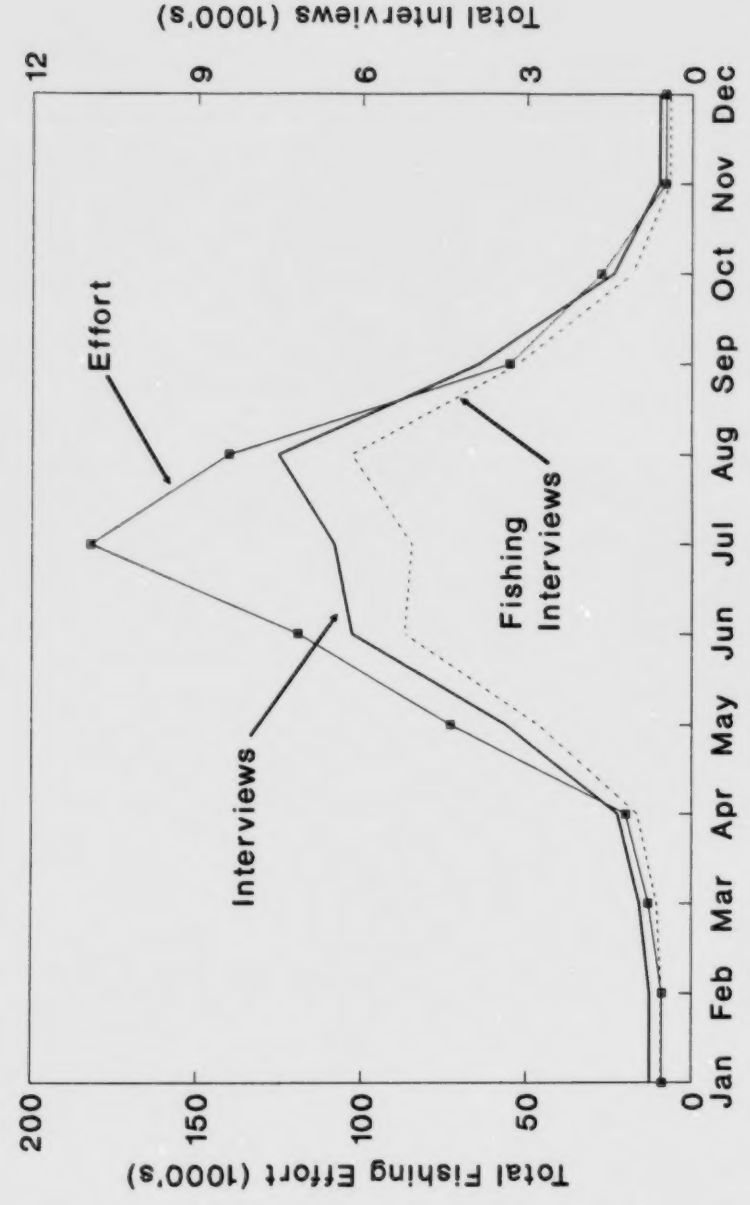

Figure 4. Comparison of monthly total fishing effort, monthly total interviews and monthly total fishing interviews, Strait of Georgia, 1988.

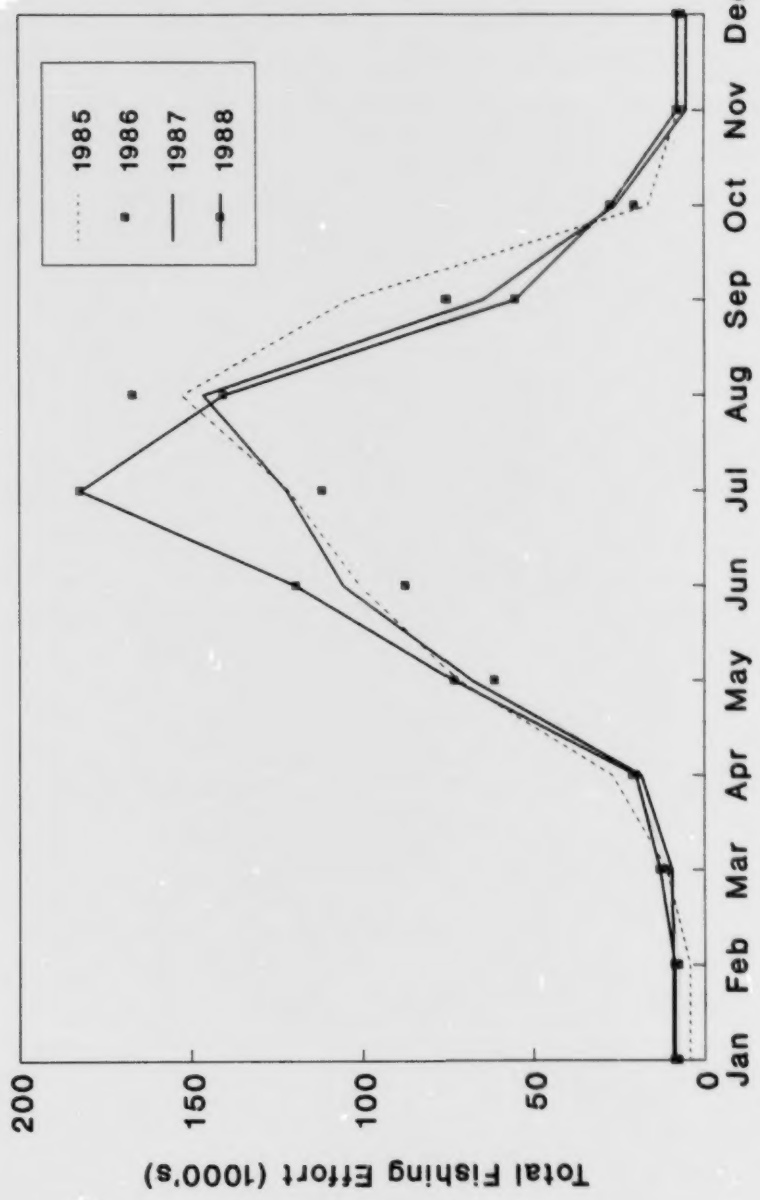

Figure 5. Monthly fishing effort estimates (number of boat trips) for the Strait of Georgia sport fishery, 1985 - 1988.

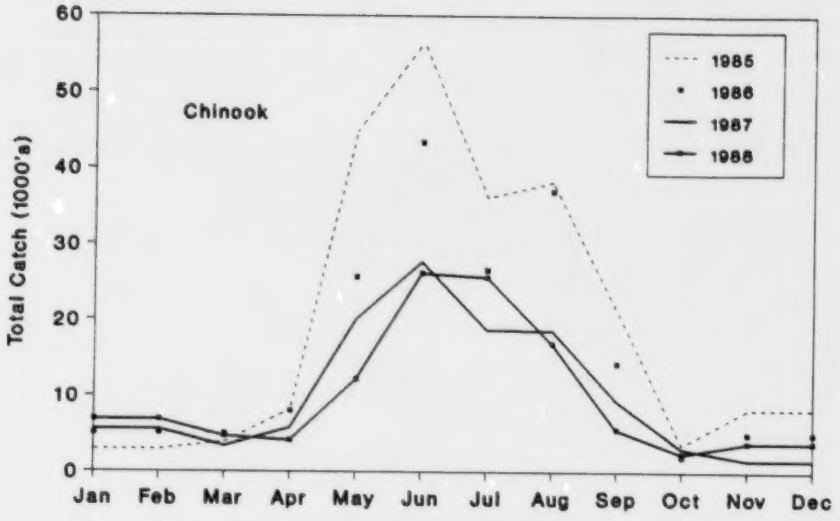

Figure 6. Monthly chinook catch for the Strait of Georgia sport fishery, 1985 - 1988.

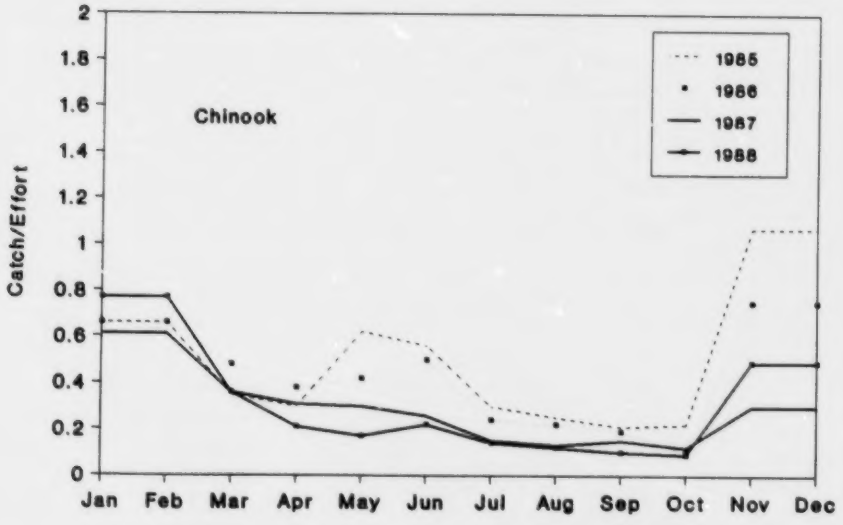

Figure 7. Monthly chinook catch per boat trip for the Strait of Georgia sport fishery, 1985 - 1988.

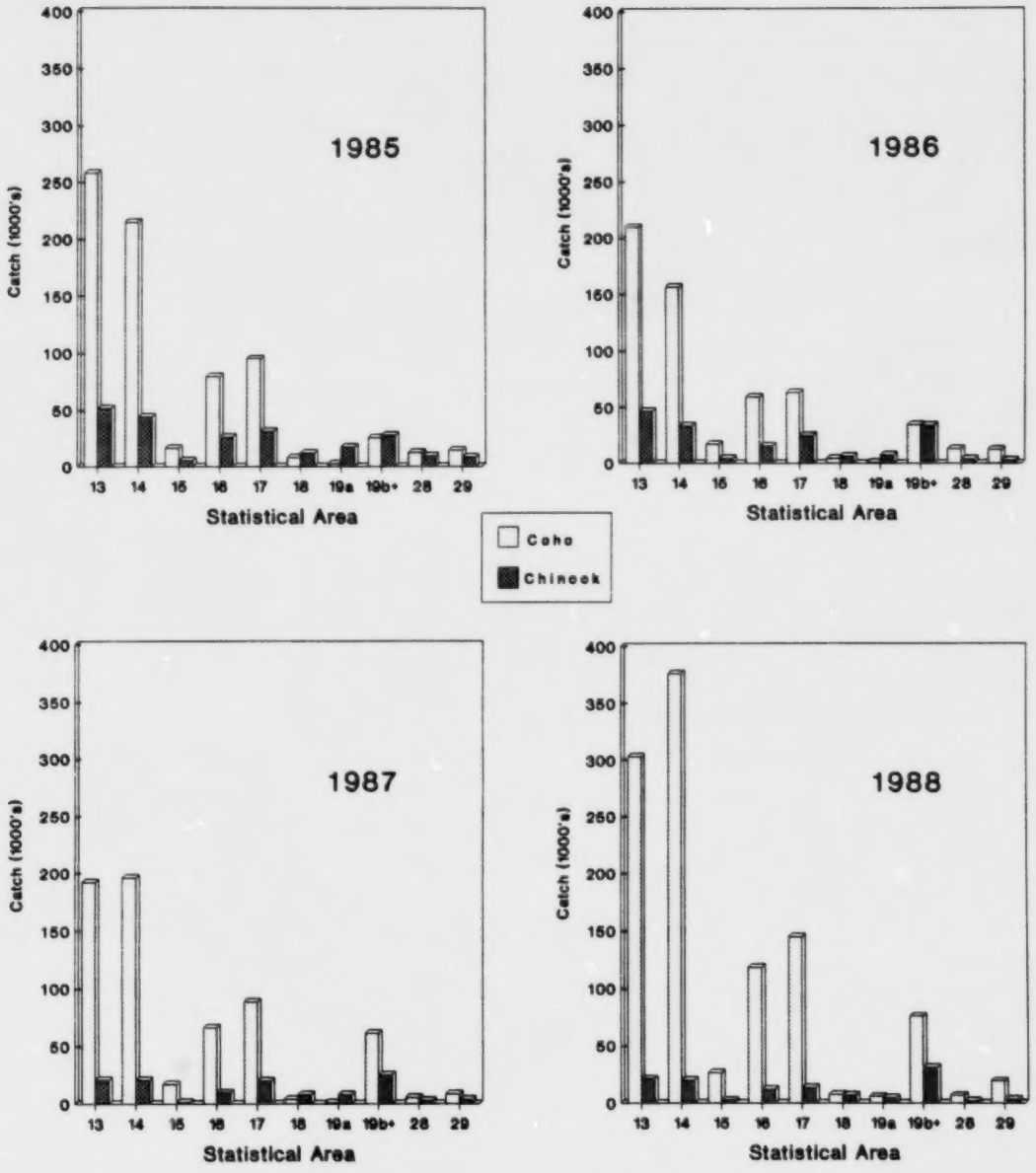

Figure 8. Annual sport catches of chinook and coho salmon by Statistical Area in the Strait of Georgia, 1985 - 1988.

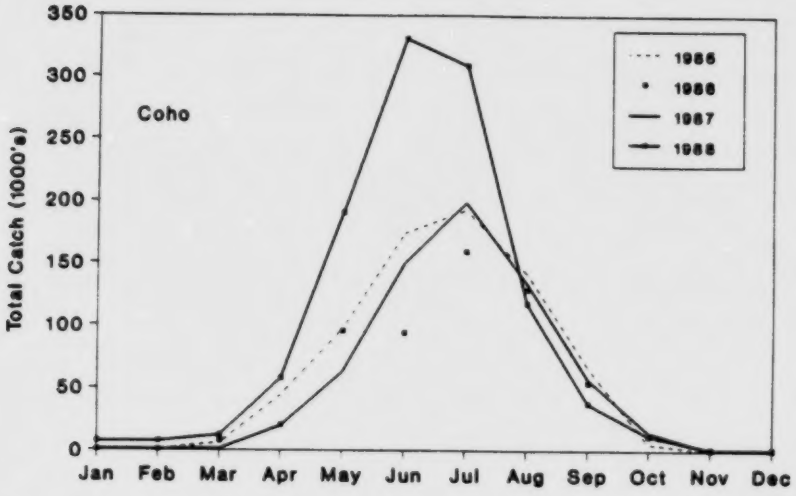

Figure 9. Monthly coho catch for the Strait of Georgia sport fishery, 1985 - 1988.

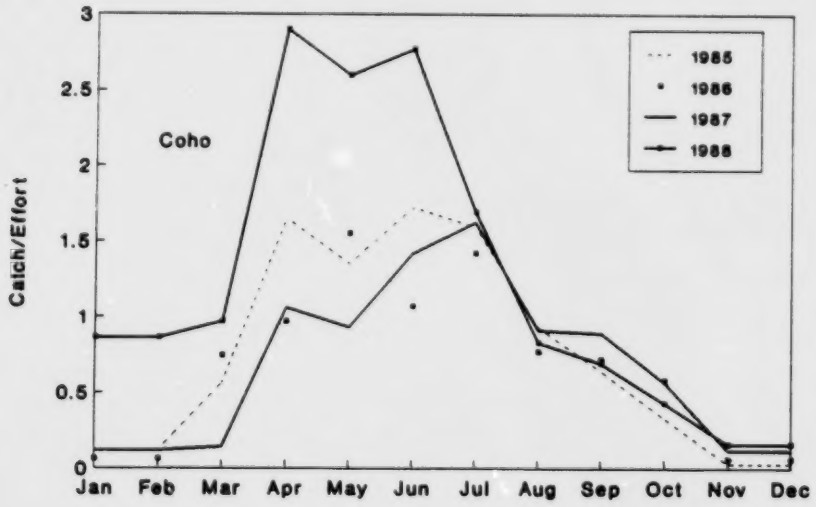

Figure 10. Monthly coho catch per boat trip for the Strait of Georgia sport fishery, 1985 - 1988.

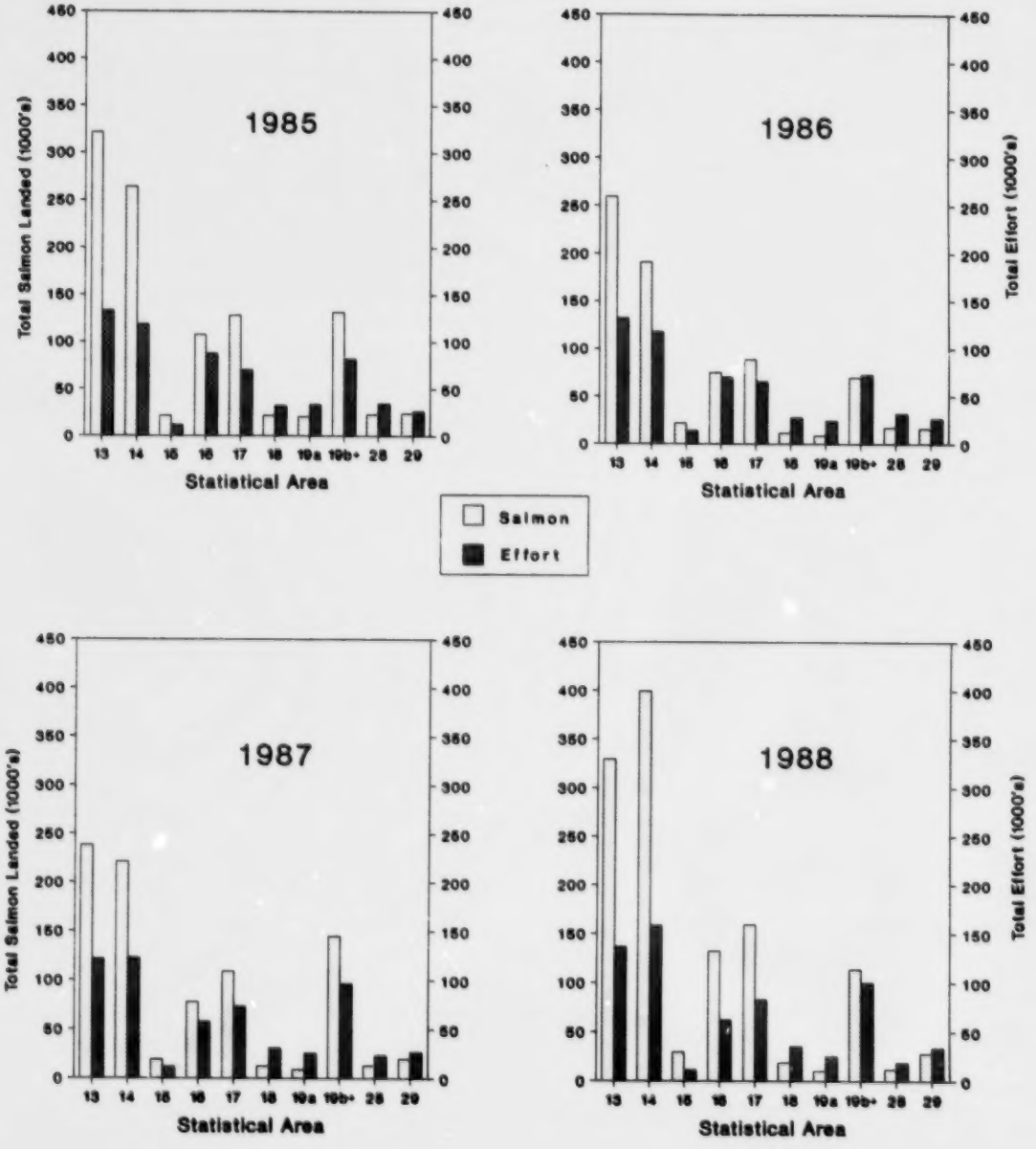

Figure 11. Total salmon landed and total fishing effort expended by Statistical Area in the Strait of Georgia sport fishery, 1985 - 1988.

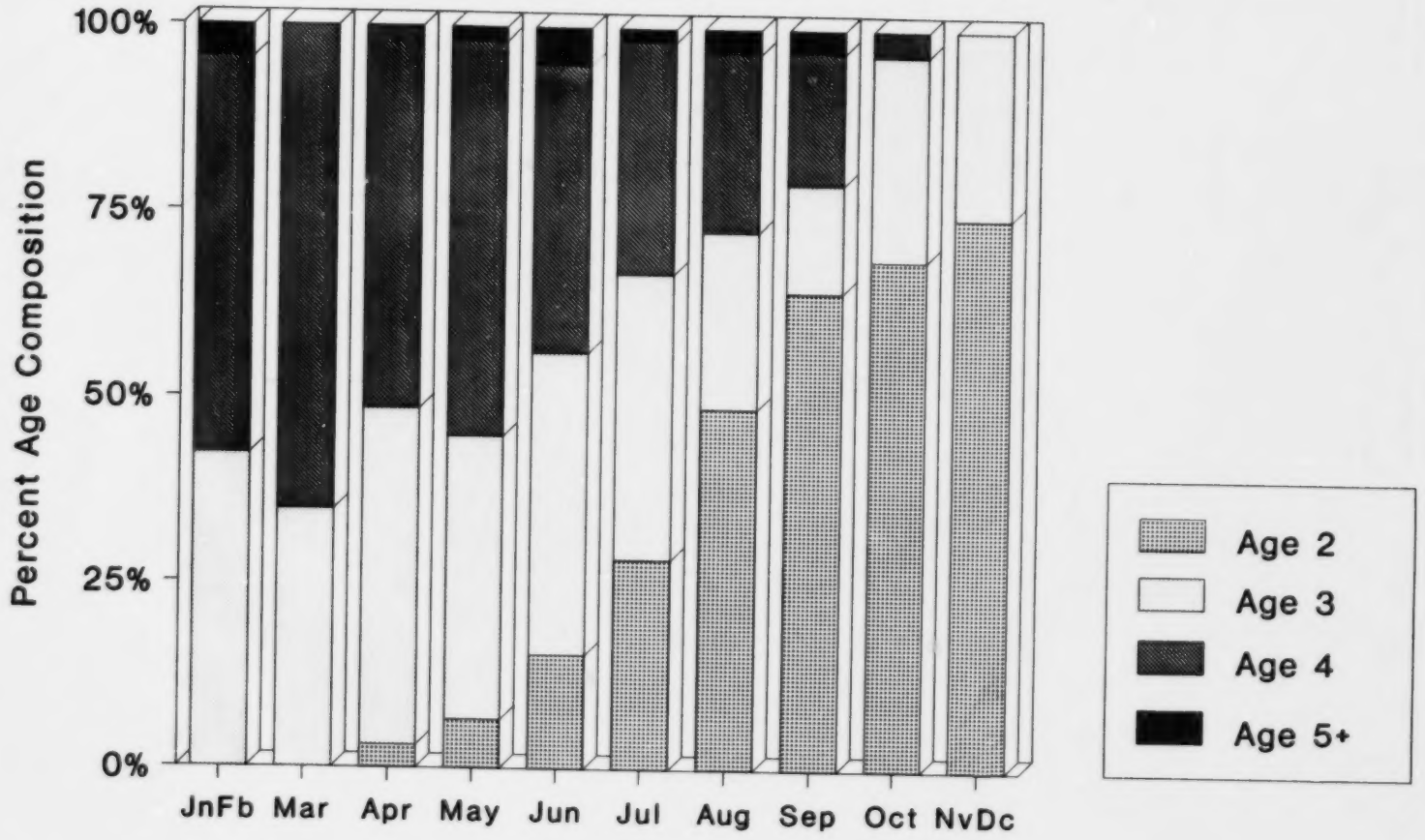

Figure 12. Monthly percent age composition of chinook salmon sampled in the Strait of Georgia Creel Survey, 1988.

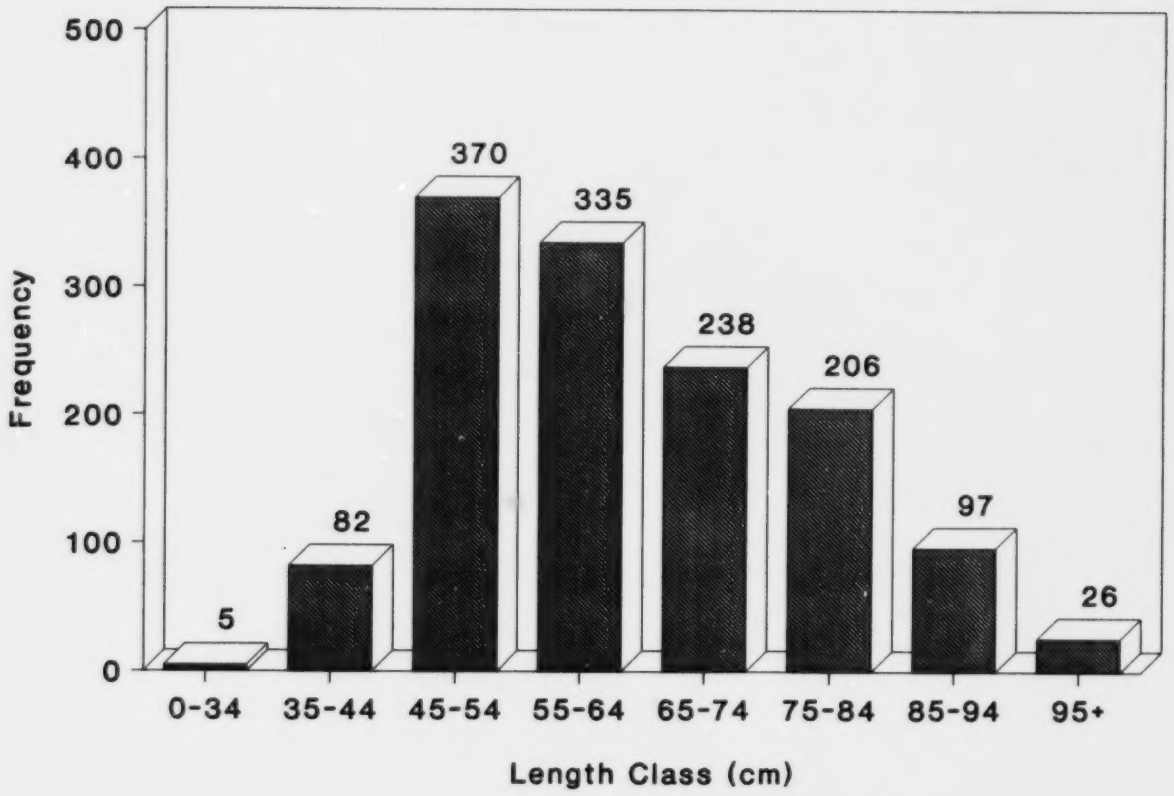

Figure 13. Length frequency distribution of chinook salmon sampled in the Strait of Georgia Creel Survey, 1988.

TABLES

Table 1. Tidal effort statistics and sport catches of coho chinook salmon for the Strait of Georgia, 1960 - 1988.*

Year	Effort (boat trips)	Catch	
		Coho	Chinook
1960	189,150	238,000	83,000
1961	199,935	152,000	63,000
1962	205,547	167,000	86,000
1963	247,590	199,000	65,000
1964	198,120	182,000	51,000
1965	250,020	175,000	53,000
1966	259,100	249,000	80,000
1967	254,500	200,000	115,000
1968	265,030	250,000	150,000
1969	281,475	200,000	185,000
1970	306,255	500,000	220,000
1971	341,123	800,000	255,000
1972	300,349	335,000	287,000
1973	293,141	373,000	272,000
1974	443,441	772,000	269,000
1975	334,490	454,000	398,000
1976	340,729	415,000	490,000
1977	363,350	682,000	372,000
1978	369,035	1,103,000	500,000
1979	404,710	708,735	350,000
1980	769,000	655,000	371,000
1981	637,000	391,200	253,300
1982	642,200	436,090	163,793
1983	574,257	404,031	198,433
1984	651,090	443,590	369,445
1985	628,513	728,197	234,838
1986	582,946	571,980	181,896
1987	589,731	641,572	121,081
1988	664,517	1,084,790	119,117

* Source: Coho catch statistics: 1960-1978 from Argue et al. (1983), 1979 from R. Kadowaki (pers. comm.), 1980-1982 from Shardlow et al. (MS 1989), 1983 from Shardlow et al.(1989), 1984 to 1987 from Shardlow and Collicutt (1989a, b, c and d).
Chinook catch statistics: 1960-1977 from Argue et al. (1983), 1978 and 1979 from B. Riddell (pers. comm.) following the methods of Argue et al. (1983), 1980-1982 from Shardlow et al. (MS 1989), 1983 from Shardlow et al.(1989), 1984 to 1987 from Shardlow and Collicutt (1989a, b, c and d).
Effort statistics: 1960-1979 from annual published and unpublished Fisheries Officer statistics, 1980-1982 from Shardlow et al. (MS 1989), 1983 from Shardlow et al.(1989), 1984 to 1987 from Shardlow and Collicutt (1989a, b, c and d).

Table 2. Number of fishing interviews by month and Statistical Area, Strait of Georgia, 1988.

Month	Statistical Area										Total	Over-flights
	13	14	15	16	17	18	19A	19B+	28	29		
Jan+Feb	16	64	0	71	71	45	119	637	36	38	1,097	4
Mar	9	77	0	32	102	14	26	337	20	13	630	4
Apr	26	231	0	137	330	18	81	95	50	22	990	4
May	342	693	0	425	627	32	190	155	200	114	2,778	7
Jun	979	1,599	82	906	536	67	229	289	391	149	5,227	10
Jul	1,194	982	121	959	522	57	225	402	387	250	5,099	11
Aug	1,769	1,055	61	668	486	99	124	725	388	818	6,193	10
Sep	614	567	41	355	160	88	64	677	175	424	3,165	8
Oct	112	150	0	87	108	58	45	417	75	29	1,081	6
Nov+Dec	11	22	0	160	56	35	21	402	54	41	802	4
Total	5,072	5,440	305	3,800	2,998	513	1,124	4,136	1,776	1,898	27,062	68

Table 3. Fishing effort and catch by species and month, Strait of Georgia, 1988.

Month		Effort No. Boat Trips	Coho	Chinook	Pink	Sockeye	Chum	Rock-Fish	Lingcod		Dog-Fish	Other Finfish	Total Finfish	
Jan+Feb	Estimate	17,797	15,234	13,705	0	0	0	2,506	58	*	78	1,564	33,145	
	S.E.	2,797	3,017	3,834	0	0	0	386	29		54	346	4,907	
Mar	Estimate	13,041	12,608	4,702	2	0	0	2,653	71	*	5	4,048	24,089	
	S.E.	1,006	1,948	671	3	0	0	530	41		9	1,224	2,455	
Apr	Estimate	19,981	57,859	4,148	5	0	0	7,185	1,317		0	5,708	76,222	
	S.E.	1,942	9,209	1,023	7	0	0	1,116	449		0	2,269	9,615	
May	Estimate	73,084	189,891	12,142	431	0	0	20,500	8,330		420	6,078	237,792	
	S.E.	6,089	20,070	1,347	137	0	0	2,529	1,017		131	1,680	20,369	
Jun	Estimate	119,325	330,968	26,118	2,757	0	0	25,153	12,041		799	10,202	408,038	
	S.E.	5,681	21,682	1,456	336	0	0	1,633	1,032		153	1,756	21,890	
Jul	Estimate	182,338	308,613	25,642	1,826	7,321	11	62,644	19,230		1,436	19,109	445,832	
	S.E.	7,072	13,123	1,288	265	1,764	7	4,260	1,242		182	2,722	14,289	
Aug	Estimate	140,421	117,167	16,875	3,501	6,260	91	46,113	16,095		774	9,884	216,760	
	S.E.	5,913	6,037	968	535	735	33	3,088	1,272		164	1,365	7,159	
Sep	Estimate	55,240	38,006	5,566	172	2,692	561	13,114	4,552		240	3,794	68,697	
	S.E.	3,169	3,212	555	75	474	88	1,192	475		82	927	3,657	
Oct	Estimate	27,439	11,921	2,456	149	103	432	10,051	3,565		83	4,259	33,019	
	S.E.	2,917	1,880	476	132	52	132	1,434	774		4(	1,058	2,752	
Nov+Dec	Estimate	15,851	2,523	7,763	0	0	3,707	4,816	670	*	279	6,399	26,157	
	S.E.	1,940	578	1,506	0	0	2,185	1,195	201		153	2,985	4,216	
Total	Estimate	664,517	1,084,790	119,117	8,843	16,376	4,802	194,735	65,929		4,114	71,045	1,569,751	**
	S.E.	13,757	34,546	5,053	715	1,970	2,191	6,582	2,516		369	5,730	36,205	

* A total closure for lingcod was in effect from January 1 to April 15, and November 15 to December 31. Reported figures most likely represent illegal catches by anglers.

** In addition, an estimated 1,752 steelhead, cutthroat trout and unidentified salmon were caught by sport fishermen.

Table 4. Fishing effort and catch by species and Statistical Area, Strait of Georgia, 1988.

Statistical Area		Effort No. Boat Trips	Coho	Chinook	Pink	Sockeye	Chum	Rock-Fish	Lingcod	Dog-Fish	Other Finfish	Total Finfish
13	Estimate	137,071	303,009	21,328	4,751	220	139	24,727	22,580	334	6,529	383,617
	S.E.	6,071	20,001	1,261	510	62	48	1,636	1,511	87	591	20,180
14	Estimate	158,629	376,028	20,208	2,961	27	77	30,035	11,540	212	6,047	447,135
	S.E.	8,987	24,432	1,598	467	10	32	3,262	1,244	61	664	24,745
15	Estimate	11,196	26,449	2,821	142	5	1	2,784	1,285	20	531	34,038
	S.E.	837	2,442	302	32	2	1	288	160	8	78	2,484
16	Estimate	62,719	118,812	12,167	424	1	177	38,177	9,802	321	5,692	185,573
	S.E.	2,523	5,916	925	148	2	52	2,745	900	122	716	6,690
17	Estimate	82,905	145,001	13,627	383	59	168	30,460	5,796	232	11,132	206,858
	S.E.	3,699	10,397	907	83	47	90	2,466	700	75	2,925	11,139
18	Estimate	35,024	7,583	7,219	0	313	3,762	17,125	3,479	374	14,048	53,903
	S.E.	1,644	1,094	883	0	67	2,185	2,661	536	135	3,986	5,480
19A	Estimate	24,940	5,812	4,588	0	0	0	6,292	675	126	4,759	22,252
	S.E.	2,162	1,051	650	0	0	0	1,113	165	113	1,629	2,337
19B+	Estimate	100,006	75,878	31,233	56	9,535	175	28,640	8,348	395	12,202	166,462
	S.E.	6,185	6,557	4,261	33	1,875	75	2,491	902	132	1,690	8,635
28	Estimate	18,819	6,871	2,297	41	2,197	91	5,953	727	622	4,084	22,883
	S.E.	1,258	591	342	20	268	29	803	106	154	796	1,361
29	Estimate	33,208	19,347	3,629	85	4,019	212	10,542	1,697	1,478	6,021	47,030
	S.E.	1,918	1,333	373	22	533	54	1,068	185	178	971	2,086
Total	Estimate	664,517	1,084,790	119,117	8,843	16,376	4,802	194,735	65,929	4,114	71,045	1,569,751 *
	S.E.	13,757	34,546	5,052	714	1,970	2,190	6,582	2,516	368	5,731	36,205

* In addition, an estimated 1,752 steelhead, cutthroat trout and unidentified salmon were caught by sport fishermen.

Table 5. Monthly catch success (catch per boat trip) by species, Strait of Gerogia, 1988.*

Month	Coho	Chinook	Total ** Salmon	Rock-Fish	Lingcod	Total Non-Salmon	All Finfish
Jan+Feb	0.86	0.77	1.63	0.14	0.00	0.23	1.86
Mar	0.97	0.36	1.33	0.20	0.01	0.52	1.85
Apr	2.90	0.21	3.10	0.36	0.07	0.71	3.81
May	2.60	0.17	2.77	0.28	0.11	0.48	3.25
Jun	2.77	0.22	3.02	0.21	0.10	0.41	3.42
Jul	1.69	0.14	1.88	0.34	0.11	0.56	2.44
Aug	0.83	0.12	1.02	0.33	0.11	0.52	1.55
Sep	0.69	0.10	0.85	0.24	0.08	0.41	1.26
Oct	0.43	0.09	0.55	0.37	0.13	0.65	1.20
Nov+Dec	0.16	0.49	0.88	0.30	0.04	0.75	1.64
Total	1.63	0.18	1.86	0.29	0.10	0.51	2.36

* Calculated using Table 3 data.

** Includes coho, chinook, pink, chum and sockeye.

Table 6. Identification of rockfish by species in each Statistical Area, Strait of Georgia, 1988.

Species	Statistical Area										Total Sample
	13	14	15	16	17	18	19A	19B+	28	29	
Quillback (Sebastes maliger)	108	235	3	642	330	74	212	390	201	54	2,249
Copper (S. caurinus)	206	185	0	67	175	119	43	259	212	29	1,295
Yelloweye (S. ruberrimus)	9	98	4	106	41	3	13	18	61	25	378
Black (S. melanops)	1	0	0	7	0	0	2	46	3	1	60
Tiger (S. nigrocinctus)	0	8	12	114	3	2	0	1	3	8	151
Yellowtail (S. flavidus)	0	0	0	0	0	0	0	9	1	0	10
China (S. nebulosus)	0	0	0	4	0	0	1	1	3	4	13
Canary (S. pinniger)	0	2	0	2	1	0	0	35	3	2	45
Unidentified	560	210	23	1,153	120	76	77	593	291	130	3,233
Total sample	884	738	42	2,095	670	274	348	1,352	778	253	7,434

Table 7. Estimated catch of rockfish by species and statistical area, Strait of Georgia, 1988. +

Species		Statistical Area										
		13	14	15	16	17	18	19A	19B+	28	29	Total
Quillback	Catch	3,021	9,564	199	11,699	15,003	4,625	3,833	8,262	1,538	2,250	59,994
	S.D.	338	1,161	113	925	1,350	856	698	801	228	356	2,489
Copper	Catch	5,762	7,529	0	1,221	7,956	7,438	777	5,487	1,622	1,208	39,000
	S.D.	519	949	0	171	827	1,267	178	568	239	245	1,990
Yelloweye	Catch	252	3,988	265	1,932	1,864	188	235	381	467	1,042	10,614
	S.D.	85	575	130	230	321	113	77	96	86	225	772
Black	Catch	28	0	0	128	0	0	36	974	23	42	1,231
	S.D.	28	0	0	49	0	0	27	165	14	42	182
Other *	Catch	15,664	8,954	2,320	23,197	5,637	4,874	1,411	13,536	2,303	6,000	83,896
	S.D.	1,512	2,839	231	2,568	1,863	2,175	845	2,281	727	949	5,705
Total	Catch	24,727	30,035	2,784	38,177	30,460	17,125	6,292	28,640	5,953	10,542	194,735
	S.D.	1,636	3,262	288	2,745	2,466	2,661	1,113	2,491	803	1,068	6,582

+ Calculated using data from Table 6 and Appendix A-9.

* Other includes tiger, yellowtail, china, canary and unidentified rockfish.

Table 8. Monthly number of marked chinook observed by region, Strait of Georgia, 1988.

Month		North Gulf	South Gulf	Victoria	Total Sample
Jan+Feb	Obs *	1	1	23	25
	Insp **	33	58	807	898
Mar	Obs	1	0	5	6
	Insp	7	19	216	242
Apr	Obs	1	4	0	5
	Insp	30	82	19	131
May	Obs	13	15	1 +	29
	Insp	163	226	27	416
Jun	Obs	32	19	5 +	56
	Insp	743	295	125	1,163
Jul	Obs	18	8	3 +	29
	Insp	480	157	102	739
Aug	Obs	12	7	1	20
	Insp	431	132	137	700
Sep	Obs	8	2	1	11
	Insp	190	46	55	291
Oct	Obs	0	3	1	4
	Insp	71	29	15	115
Nov+Dec	Obs	9	4	12	25
	Insp	179	83	286	548
Total	Obs	95	63	52	210
	Insp	2,327	1,127	1,789	5,243
Proportion of marks		0.041	0.056	0.029	0.040

* Obs - marks observed.

** Insp - fish inspected.

\+ No samples taken in Victoria region. Data estimated using 1983-89 average proportions.

Table 9. Monthly number of marked coho observed by region, Strait of Georgia, 1988.

Month		North Gulf	South Gulf	Victoria	Total Sample
Jan+Feb	Obs *	32	8	9	49
	Insp **	312	239	295	846
Mar	Obs	27	12	11	50
	Insp	432	173	227	832
Apr	Obs	94	100	11	205
	Insp	2,083	1,853	155	4,091
May	Obs	186	196	4 +	386
	Insp	4,137	3,163	146	7,446
Jun	Obs	557	84	26 +	667
	Insp	13,037	1,560	1,022	15,619
Jul	Obs	329	59	43 +	431
	Insp	7,189	1,060	1,649	9,898
Aug	Obs	174	128	8	310
	Insp	3,620	1,148	258	5,026
Sep	Obs	82	6	32	120
	Insp	1,381	171	645	2,197
Oct	Obs	8	2	7	17
	Insp	276	72	163	511
Nov+Dec	Obs	2	0	1	3
	Insp	43	13	31	87
Total	Obs	1,491	595	152	2,238
	Insp	32,510	9,452	4,591	46,553
Proportion of marks		0.046	0.063	0.033	0.048

* Obs - marks observed.

** Insp - fish inspected.

\+ No samples taken in Victoria region. Data estimated using 1983-89 average proportions.

Table 10. Monthly estimated catch of marked chinook by region, Strait of Georgia, 1988. *

Month		North Gulf	South Gulf	Victoria	Total
Jan+Feb	Catch	29	38	301	368
	S.D.	31	39	127	136
Mar	Catch	17	0	88	105
	S.D.	20	0	42	47
Apr	Catch	17	93	0	110
	S.D.	19	49	0	53
May	Catch	451	302	72 **	825
	S.D.	148	84	78	187
Jun	Catch	644	444	171 **	1,259
	S.D.	122	105	81	180
Jul	Catch	659	256	89 **	1,004
	S.D.	159	93	52	191
Aug	Catch	299	198	18	515
	S.D.	88	77	18	118
Sep	Catch	136	72	13	221
	S.D.	50	54	13	75
Oct	Catch	0	139	19	158
	S.D.	0	87	20	89
Nov+Dec	Catch	99	157	106	362
	S.D.	47	87	58	115
Total	Catch	2,351	1,699	877	4,927
	S.D.	276	234	194	410

* Calculated using data from Table 8 and Appendix B-3.

** No samples taken in Victoria region. Data estimated using 1983-89 average proportions.

Table 11. Monthly estimated catch of marked coho by region, Strait of Georgia, 1988. *

Month		North Gulf	South Gulf	Victoria	Total
Jan+Feb	Catch	733	99	157	989
	S.D.	204	42	95	229
Mar	Catch	242	318	201	761
	S.D.	98	119	73	171
Apr	Catch	1,130	1,407	479	3,016
	S.D.	280	378	279	547
May	Catch	5,711	3,440	202 **	9,353
	S.D.	927	495	149	1,061
Jun	Catch	12,236	2,026	177 **	14,439
	S.D.	1,047	266	57	1,082
Jul	Catch	11,616	1,642	660 **	13,918
	S.D.	851	263	117	898
Aug	Catch	4,300	2,381	197	6,878
	S.D.	423	261	73	502
Sep	Catch	1,466	108	508	2,082
	S.D.	232	45	113	262
Oct	Catch	156	89	144	389
	S.D.	70	68	67	118
Nov+Dec	Catch	69	0	9	78
	S.D.	56	0	12	57
Total	Catch	37,659	11,510	2,734	51,903
	S.D.	1,746	786	393	1,955

* Calculated using data from Table 9 and Appendix B-2.

** No samples taken in Victoria region. Data estimated using 1983-89 average proportions.

Table 12. Monthly number and percent age composition of chinook sampled for age in the Strait of Georgia Creel Survey, 1988 (n gives sample size).

Month	Age 2		Age 3		Age 4		Age 5+		Total Sample
	n	%	n	%	n	%	n	%	
Jan+Feb	0	0.0%	58	42.3%	73	53.3%	6	4.4%	137
Mar	0	0.0%	16	34.8%	30	65.2%	0	0.0%	46
Apr	1	3.0%	15	45.5%	17	51.5%	0	0.0%	33
May	7	6.5%	41	38.3%	57	53.3%	2	1.9%	107
Jun	36	15.3%	96	40.9%	91	38.7%	12	5.1%	235
Jul	46	28.2%	63	38.7%	51	31.3%	3	1.8%	163
Aug	59	48.8%	29	24.0%	29	24.0%	4	3.3%	121
Sep	62	64.6%	14	14.6%	17	17.7%	3	3.1%	96
Oct	20	69.0%	8	27.6%	1	3.4%	0	0.0%	29
Nov+Dec	65	74.7%	22	25.3%	0	0.0%	0	0.0%	87
Total	296	-	362	-	366	-	30	-	1,054
Overall age composition of catch *	-	26.4%	-	35.3%	-	35.4%	-	2.8%	-

* Overall age composition of estimated catch based on data from Table 13.

Table 13. Monthly estimated catch at age of chinook in the Strait of Georgia, 1988. *

Month		Age 2	Age 3	Age 4	Age 5+	Total **
Jan+Feb	Catch	0	5,802	7,303	600	13,705
	S.D.	0	1,731	2,131	300	2,762
Mar	Catch	0	1,635	3,067	0	4,702
	S.D.	0	407	550	0	684
Apr	Catch	126	1,885	2,137	0	4,148
	S.D.	131	594	645	0	887
May	Catch	794	4,653	6,468	227	12,142
	S.D.	305	772	928	162	1,256
Jun	Catch	4,001	10,669	10,114	1,334	26,118
	S.D.	654	1,028	1,004	383	1,625
Jul	Catch	7,236	9,911	8,023	472	25,642
	S.D.	975	1,099	1,016	271	1,807
Aug	Catch	8,228	4,044	4,044	558	16,874
	S.D.	902	696	696	277	1,364
Sep	Catch	3,595	812	986	174	5,567
	S.D.	451	217	239	101	564
Oct	Catch	1,694	678	84	0	2,456
	S.D.	392	246	86	0	471
Nov+Dec	Catch	5,800	1,963	0	0	7,763
	S.D.	1,184	530	0	0	1,297
Total	Catch	31,474	42,052	42,226	3,365	119,117
	S.D.	2,015	2,692	2,951	651	5,053 ++
Overall age composition		26.4%	35.3%	35.4%	2.8%	100.0%

* Calculated by applying to total monthly chinook catch the monthly age proportions from Table 12.

** Monthly total catch from Table 3.

++ S.E.

Table 14. Monthly mean nose–fork length (L) at age of chinook sampled in the Strait of Georgia Creel Survey, 1988 (n gives sample size).

Month	Age 2		Age 3		Age 4		Age 5		Age 6		Total Sample
	L (cm)	n	L (cm)	n	L (cm)	n	L (cm)	n	L (cm)	n	
Jan+Feb	-	0	52.6	58	63.5	73	77.2	5	103.0	1	137
Mar	-	0	54.3	16	66.3	30	-	0	-	0	46
Apr	42.0	1	57.1	15	68.9	17	-	0	-	0	33
May	44.4	7	60.1	41	76.7	57	79.5	2	-	0	107
Jun	46.4	36	61.8	96	79.0	91	84.2	11	109.0	1	235
Jul	45.9	46	64.2	63	80.7	51	82.0	3	-	0	163
Aug	48.1	59	67.8	29	84.1	29	101.3	4	-	0	121
Sep	49.5	62	65.7	14	84.0	17	63.0	3	-	0	96
Oct	49.5	20	58.4	8	88.0	1	-	0	-	0	29
Nov+Dec	52.6	65	59.0	22	-	0	-	0	-	0	87
Total	48.8	296	60.4	362	74.9	366	82.5	28	106.0	2	1,054

APPENDICES

APPENDIX A

METHODS AND EQUATIONS USED IN ANALYSIS OF CATCH AND EFFORT STATISTICS FOR THE STRAIT OF GEORGIA SPORT FISHERY CREEL SURVEYS, 1983-1988[1].

[1]Adapted from:

Shardlow, T. F., K. K. English, T. Hoyt, G. E. Gillespie and T. A. Calvin. 1989. Strait of Georgia Creel Survey sport fishery statistics, 1983. Can. MS Rep. Fish. Aquat. Sci. 1872 : 53 p.

METHODS AND EQUATIONS USED IN ANALYSIS OF CATCH AND EFFORT STATISTICS FOR THE STRAIT OF GEORGIA SPORT FISHERY CREEL SURVEYS, 1983 - 1988.

The description of terms, variables and subscripts used in the data analysis is given in Table A-1.

Calculation of Catch and Effort Statistics

To estimate the monthly catch and effort, three components had to be calculated from that month's data:

(1) the weighted mean daily fishing pattern from interview data,
(2) the weighted mean catch per unit effort from interview data and
(3) the mean sport count from overflight data.

The equations used to estimate the means and variances for all catch and effort statistics are shown below. For April which had only overflight data, the interview data from preceding and following months were combined to estimate the mean daily fishing activity pattern and catch per unit effort. The catch and effort estimates for April are referred to as indirect estimates.

Weighting factors used to estimate the daily fishing activity pattern and mean catch per unit effort were calculated using the equations derived from DPA Consulting Ltd. (1982).

The data obtained from each shift were multiplied by the following weighting factor (W1) to expand for all possible stints at each site. The formula reads:

$$W1_{dij} = \frac{N_d}{n_{dij}} \qquad (1)$$

where N_d is the total number of days of type d in that month and n_{dij} is the number of times the jth work block at the ith site was sampled on type d days.

The interviews aggregrated by work block were multiplied by the weighting factor W2 to expand for all boats that landed in each work block. The formula reads:

$$W2_{dijk} = \frac{L_{dijk}}{I_{dijk}} \qquad (2)$$

where L_{dijk} is the number of boats landed and I_{dijk} is the number of boats interviewed on the kth stint in the jth work block at the ith site on a day type d.

Therefore, the following equations can be used to calculate an unbiased estimate of the total monthly catch ($\hat{C}_{dgr}$), fishing trips ($\hat{T}_{dg}$) and fishing activity in time block $\hat{A}_{dgt}$ for each day type (d) where g is a set of landing sites (i). These formulas read:

Table A-1. Description of terms, variables and subscripts used in this report.

DESCRIPTION OF TERMS

Shift/Stint	-	Represents a combination of a day type and landing site which was sampled on a single day. i.e. one sampling stint performed by an interviewer.
Work block	-	Represents one of four possible periods at a particular site of a given day type. Work Block 1 is before 11 AM Work Block 2 is 11 AM - 3 PM Work Block 3 is 3 PM - 7 PM Work Block 4 is after 7 PM
Day type	-	There are two possible day types: weekdays and weekends; holidays are considered to be weekend days.
Time block	-	Each day is divided into 16 time blocks which are: 1) before 7 AM 2) 7:00 - 7:59 AM 3) 8:00 - 8:59 AM . . . 15) 8:00 - 8:59 PM 16) after 9 PM

DESCRIPTION OF VARIABLES

A	-	Number of boats actively fishing
B	-	Number of boats observed on a flight
C	-	Catch
C'	-	Catch of marked salmon
CPE	-	Catch per boat trip
E	-	Effort (estimated total number of boat trips)
I	-	Number of boats interviewed and found to have been fishing
L	-	Number of boats landing
n	-	Number sampled
N	-	Population size from which n samples were observed
P	-	Proportion
T	-	Number of boat trips
V	-	Number found to be marked
W1	-	Weighting factor to expand for all possible stints at each site
W2	-	Weighting factor to expand for all boats that landed in each work block

DESCRIPTION OF SUBSCRIPTS

a	-	age
g	-	a set of landing sites
d	-	day type
i	-	site
j	-	work block
k	-	stint
l	-	landing time block
m	-	month
q	-	the next boat landing at site i and upon interviewing, found to have been fishing(q ranges from 1 to n)
r	-	species
s	-	sub-Statistical Area
t	-	time block
u	-	flight
x	-	region
y	-	annual

$$\hat{C}_{dgr} = \sum_i \sum_j \left[W1_{dij} \sum_k \sum_q \left(W2_{dijk} C_{dijkqr} \right) \right] \qquad (3)$$

$$\hat{T}_{dg} = \sum_i \sum_j \left[W1_{dij} \sum_k \sum_q \left(W2_{dijk} \right) \right] \qquad (4)$$

$$\hat{A}_{dgt} = \sum_i \sum_j \left[W1_{dij} \sum_k \sum_q \left(W2_{dijk} A_{dijkqt} \right) \right] \qquad (5)$$

where C_{dijkqr} is the catch of species r by the qth fishing party, and A_{dijkqt} can equal 0 or 1, thereby indicating whether the qth fishing party was actively fishing in time block t. Thus, the mean monthly catch per unit effort (CPE_{dgr}) measured in terms of numbers of fish kept per completed boat trip, and proportion of daily fishing effort active during the hour of the aerial survey (P_{dgt}) can be calculated with the following equations:

$$CPE_{dgr} = \frac{\hat{C}_{dgr}}{\hat{T}_{dg}} \qquad (6)$$

$$P_{dgt} = \frac{\hat{A}_{dgt}}{\hat{T}_{dg}} \qquad (7)$$

where CPE_{dgr} and P_{dgt} are calculated for each day type (d) and group of landing sites (g). The groups of landing sites reflect geographic areas with similar catch rates and/or activity patterns.

The estimated mean number of boats fishing during the hour of the sport boat count by overflight was calculated for each sub-Statistical Area using the following equation:

$$\bar{B}_{dst} = \frac{\sum_u B_{dstu}}{n_{ds}} \qquad (8)$$

where B_{dstu} is the number of boats observed fishing on flight u at time t, in sub-Statistical Area s for day type d.

The mean sport boat count at the time of the overflight ($\bar{B}_{dst}$) and proportion of daily fishing effort active during the hour of the overflight (P_{dgt}) were used in the following equation to calculate the total fishing effort for sub-Statistical Area s on day type d:

$$E_{ds} = \bar{B}_{dst} \frac{1}{P_{dgt}} N_d \qquad (9)$$

where N_d is the number of type d days in the month. Interview data for the sub-Statistical Areas fished (s) by anglers landing at each of the sites (i) within a landing group (g) were used to select the proportions (P_{dgt}) that are appropriate for each mean boat count ($\bar{B}_{dst}$).

The estimate for total effort by sub-Statistical Area and day type (E_{ds}) and the weighted catch per boat trip for a group of landing sites by day type, area and species (CPE_{dgr}) were used to calculate total catch for each species (r) and each sub-Statistical Area (s).

$$C_{sr} = \sum_{d} (E_{ds} CPE_{dgr}) \qquad (10)$$

The interview data were also used to select the catch per effort estimates (CPE_{dgr}) that should be applied to the effort estimate (E_{ds}) for a specific sub-Statistical Area (s).

Variance of Total Fishing Effort

The variance for estimates of total fishing effort has two components:

(1) the variance in aerial sport boat counts:

$$S^2_{B_{dst}} = \frac{\sum_u B^2_{dstu} - \frac{\left(\sum_u B_{dstu}\right)^2}{n_{ds}}}{n_{ds}(n_{ds}-1)} \left[\frac{N_d - n_{ds}}{N_d - 1}\right] \qquad (11)$$

where B_{dstu} is the aerial sport boat count at time t during an aerial survey u on a type d day in sub-area s; n_{ds} is the number of aerial surveys in which boats were counted on type d days, in sub-Statistical Area s; and N_d is the total number of type d days in the month.

(2) the variance in the proportion of boats fishing during the hours of the aerial boat counts:

$$S^2_{P_{dgt}} = \frac{P_{dgt}(1-P_{dgt})}{I_{dg}} \qquad (12)$$

where P_{dgt} is the mean proportion of boats fishing for a group of landing sites g during the hour of the aerial boat count t on type d days, and I_{dg} is the total number of sport fishing boats interviewed. The above formula assumes P_{dgt} is unbiased and normally distributed where the number of interviews is large.

The variances for boat counts ($S^2_{B_{dst}}$) and proportion of boats fishing ($S^2_{P_{dgt}}$) were combined in the following equation to calculate variance for effort:

$$S^2_{E_{ds}} = N^2_d \left(\frac{B^2_{dst}}{P^2_{dgt}}\right)\left(\frac{S^2_{B_{dst}}}{B^2_{dst}} + \frac{S^2_{P_{dgt}}}{P^2_{dgt}}\right) \qquad (13)$$

where $S^2_{E_{ds}}$ is the variance for total effort on type d days in sub-area s, and the formula is the standard formula for the variance of a ratio of two independent random variables.

Variance of Total Catch

The variance for estimates of total catch had two components: (1) the variance for total effort (presented above), and (2) the variance for catch per boat trip.

The variance for catch per boat trip($S^2_{CPE_{dgr}}$) was calculated using the following equation:

$$S^2_{CPE_{dgr}} = \frac{SS_{CPE_{dgr}} - \frac{\left(S_{CPE_{dgr}}\right)^2}{I_{dg}}}{I_{dg}\left(I_{dg}-1\right)} \qquad (14)$$

where $SS_{CPE_{dgr}}$ is the weighted sum of squares for CPE_{dgr}, and $S_{CPE_{dgr}}$ is the weighted sum for CPE_{dgr}, such that the sum of the weighting factors used to estimate CPE_{dgr} was equal to the number of interviewed boat trips (I_{dg}).

The variance for total effort and the variance in the catch per boat trip for the appropriately grouped landing sites were combined in the following equation to calculate variance for total catch:

$$S^2_{C_{sr}} = \sum_d \left(E^2_{ds} S^2_{CPE_{dgr}} + CPE^2_{dgr} S^2_{E_{ds}} + S^2_{CPE_{dgr}} S^2_{E_{ds}} \right) \qquad (15)$$

which is the standard formula for the variance of the product of two independent random variables, and where S^2C_{sr} is the variance for total number of species r in sub-Statistical Area s.

Estimation of Marked Chinook and Coho Salmon

Incidence of marked (adipose-clipped) chinook and coho was recorded in each interview. The proportion of marks observed for each region, month and species (P_{xmr}) was calculated as:

$$P_{xmr} = \frac{V_{xmr}}{n_{xmr}} \qquad (16)$$

where V is the number of marked fish observed and n is the number of fish inspected by region(x), month(m) and species (r).

The variance of each proportion was calculated as:

$$S^2_{P_{xmr}} = \frac{P_{xmr}(1 - P_{xmr})}{n_{xmr}} \qquad (17)$$

Monthly catch estimates of marked salmon were calculated as:

$$C'_{xmr} = P_{xmr} C_{xmr} \qquad (18)$$

where C_{xmr} is the estimated catch of species r in region x and month m.

The variance of the marked catch estimates was calculated as:

$$S^2_{C'_{xmr}} = P^2_{xmr} S^2_{C_{xmr}} + C^2_{xmr} S^2_{P_{xmr}} + S^2_{C_{xmr}} S^2_{P_{xmr}} \qquad (19)$$

where S^2C_{xmr} is the variance of the catch estimate of species r in region x and month m.

The estimated annual proportions of marked salmon caught in each region (weighted by the corresponding regional annual catch estimates) were calculated as:

$$P_{xry} = \frac{C'_{xry}}{C_{xry}} \qquad (20)$$

where

$$C'_{xry} = \sum_{m} C'_{xmr} \quad \text{and} \quad C_{xry} = \sum_{m} C_{xmr} \qquad (21)$$

The variance of the annual proportions was calculated as:

$$S^2_{P_{xry}} = \left(\frac{C'_{xry}}{C_{xry}}\right)^2 \left[\frac{S^2_{C'_{xry}}}{(C'_{xry})^2} + \frac{S^2_{C_{xry}}}{(C_{xry})^2}\right] \qquad (22)$$

where $S^2_{C_{xry}}$ is the variance of the annual estimated catch of species r in region x.

Estimation of Age Composition of Chinook Catch

Scale samples and length measurements were taken in a subsampling program during the interview process. Ages used in this report represent total age of the fish (including both freshwater and oceanic life) according to the Gilbert-Rich (1927) recording convention.

The proportion of chinook at each age and month (P_{am}) was calculated as:

$$P_{am} = \frac{a_m}{n_m} \qquad (23)$$

where a_m represents the number of fish observed at age a during month m, and n_m is the total number of fish biosampled in that month.

The variance of each proportion was calculated as:

$$S^2_{am} = \frac{P_{am}(1-P_{am})}{n_m} \qquad (24)$$

The catch at age of chinook in each month was calculated as:

$$C_{am} = P_{am} C_m \qquad (25)$$

where C_m is the estimated catch of chinook salmon in a given month m.

The variance of the catch at age estimate was calculated as:

$$S^2_{C_{am}} = P^2_{am} S^2_{C_m} + C^2_m S^2_{P_{am}} + S^2_{C_m} S^2_{P_{am}} \qquad (26)$$

where $S^2_{C_m}$ is the variance of the monthly catch estimate C_m.

The annual catch at age was calculated as:

$$C_{ay} = \sum_m C_{am} \qquad (27)$$

with a variance

$$S^2_{C_{ay}} = \sum_m S^2_{C_{am}} \qquad (28)$$

The annual proportion at age (weighted by monthly catch) was calculated as:

$$P_{ay} = \frac{C_{ay}}{C_y} \qquad (29)$$

with a variance

$$S^2_{P_{ay}} = \left(\frac{C_{ay}}{C_y}\right)^2 \left[\frac{S^2_{C_{ay}}}{(C_{ay})^2} + \frac{S^2_{C_y}}{(C_y)^2}\right] \qquad (30)$$

APPENDIX B

CATCH AND EFFORT STATISTICS BY MONTH AND STATISTICAL AREA FOR STRAIT OF GEORGIA, 1988.

APPENDIX B-1. STRAIT OF GEORGIA FISHING EFFORT (NO. BOAT TRIPS), 1988.

Month		Statistical Area 13	14	15	16	17	18	19A	19B+	28	29	Total
Jan+Feb	Estimate	949	1,213	434	645	2,278	1,388	1,199	7,945	929	817	17,797
	S.E.	192	250	197	146	303	195	260	2,705	262	284	2,797
March	Estimate	370	870	38	514	2,672	966	1,039	5,529	454	589	13,041
	S.E.	130	332	26	180	597	222	157	576	186	239	1,007
April	Estimate	1,112	2,935	258	1,696	6,432	1,207	1,090	3,326	924	1,001	19,981
	S.E.	264	754	58	517	1,160	119	361	1,141	246	114	1,943
May	Estimate	10,411	22,263	966	8,154	13,141	2,892	3,563	7,059	1,564	3,071	73,084
	S.E.	1,462	5,320	210	1,117	1,771	375	809	846	397	736	6,089
June	Estimate	24,765	33,043	3,076	12,65[illegible]	16,199	5,222	2,232	14,807	2,118	5,207	119,325
	S.E.	3,733	2,661	503	1,117	1,192	483	400	2,743	322	571	5,682
July	Estimate	42,645	51,764	3,307	17,001	16,172	9,264	3,655	27,513	4,860	6,157	182,338
	S.E.	2,515	4,853	505	1,267	1,693	970	601	3,603	754	753	7,073
August	Estimate	41,033	32,403	2,185	13,639	13,164	4,878	5,793	13,790	4,331	9,205	140,421
	S.E.	3,222	4,148	237	723	1,264	364	1,404	1,430	480	910	5,914
September	Estimate	12,774	10,604	592	4,280	5,180	3,406	3,691	9,099	1,822	3,792	55,240
	S.E.	1,820	1,708	169	692	792	405	1,123	848	278	677	3,169
October	Estimate	2,140	3,046	117	1,961	4,646	2,869	2,052	7,521	736	2,351	27,439
	S.E.	781	961	71	698	1,446	463	185	1,812	387	845	2,918
Nov+Dec	Estimate	872	488	223	2,173	3,021	2,932	626	3,417	1,081	1,018	15,851
	S.E.	181	211	129	676	396	881	107	1,430	365	307	1,941
Total	Estimate	137,071	158,629	11,196	62,719	82,905	35,024	24,940	100,006	18,819	33,208	664,517
	S.E.	6,071	8,987	837	2,523	3,700	1,644	2,162	6,186	1,259	1,918	13,758

APPENDIX B-2. STRAIT OF GEORGIA COHO CATCH SUMMARY, 1988.

Month		Statistical Area 13	14	15	16	17	18	19A	19B+	28	29	Total
Jan+Feb	Catch	30	6,154	423	541	1,052	0	1,899	5,135	0	0	15,234
	S.E.	33	1,527	305	201	259	0	610	2,490	0	0	3,018
March	Catch	251	3,280	53	288	4,537	0	49	4,150	0	0	12,608
	S.E.	235	1,328	47	175	1,099	0	53	856	0	0	1,948
April	Catch	2,652	15,729	807	5,857	25,115	283	52	6,750	52	562	57,859
	S.E.	1,375	5,064	196	2,058	6,485	252	36	3,279	33	355	9,209
May	Catch	31,185	81,073	2,168	12,590	50,722	1,072	254	7,364	892	2,571	189,891
	S.E.	4,829	17,705	493	1,910	6,955	302	102	3,643	171	627	20,071
June	Catch	106,168	127,112	11,809	41,304	30,535	1,567	301	6,942	1,005	4,225	330,968
	S.E.	17,596	11,425	1,910	3,860	2,750	414	137	1,766	167	727	21,682
July	Catch	104,196	105,385	8,491	35,743	20,109	2,546	857	25,295	2,000	3,991	308,613
	S.E.	6,602	10,169	1,352	3,111	2,635	886	200	2,344	417	529	13,123
August	Catch	41,996	27,797	2,116	17,549	8,678	1,132	2,044	6,356	2,557	6,942	117,167
	S.E.	3,810	4,159	304	1,285	1,058	163	791	774	333	640	6,037
September	Catch	14,372	6,029	546	3,744	1,438	252	202	10,248	279	896	38,006
	S.E.	2,436	1,220	148	842	270	103	144	1,422	60	190	3,212
October	Catch	2,080	2,758	36	502	2,315	695	30	3,354	34	117	11,921
	S.E.	1,067	907	27	239	826	218	38	884	25	59	1,880
Nov+Dec	Catch	79	711	0	694	500	36	124	284	52	43	2,523
	S.E.	65	447	0	232	157	37	112	182	57	48	579
Total	Catch	303,009	376,028	26,449	118,812	145,001	7,583	5,812	75,878	6,871	19,347	1,084,790
	S.E.	20,002	24,433	2,443	5,916	10,397	1,094	1,052	6,558	592	1,334	34,548

APPENDIX B-3. STRAIT OF GEORGIA CHINOOK CATCH SUMMARY, 1988.

Month		Statistical Area 13	14	15	16	17	18	19A	19B+	28	29	Total
Jan+Feb	Catch	479	26	198	263	553	1,367	62	10,545	109	103	13,705
	S.E.	256	27	105	71	98	348	52	3,804	88	83	3,834
March	Catch	41	25	25	25	252	443	25	3,816	25	25	4,702
	S.E.	47	19	38	10	90	255	27	609	32	25	671
April	Catch	40	51	48	377	612	230	391	1,720	334	345	4,148
	S.E.	31	25	16	174	237	72	153	953	110	101	1,023
May	Catch	2,358	1,742	174	1,377	2,149	435	1,119	1,936	255	597	12,142
	S.E.	468	910	49	248	397	127	307	631	79	179	1,347
June	Catch	3,858	6,941	840	3,305	3,550	1,230	544	4,273	458	1,119	26,118
	S.E.	742	723	175	407	416	280	162	732	93	174	1,457
July	Catch	6,792	6,804	765	3,217	2,673	944	542	3,038	352	515	25,642
	S.E.	542	919	132	390	447	202	135	271	92	112	1,289
August	Catch	5,584	3,431	313	1,398	1,791	695	828	2,406	99	330	16,875
	S.E.	554	552	50	151	269	119	343	308	22	50	969
September	Catch	1,732	961	124	404	317	698	555	693	25	57	5,566
	S.E.	310	214	36	80	73	176	326	127	13	19	556
October	Catch	126	180	80	448	688	293	309	279	25	28	2,456
	S.E.	68	73	49	271	311	109	146	104	12	25	477
Nov+Dec	Catch	318	47	254	1,353	1,042	884	213	2,527	615	510	7,763
	S.E.	225	42	150	583	214	631	112	1,133	269	208	1,507
Total	Catch	21,328	20,208	2,821	12,167	13,627	7,219	4,588	31,233	2,297	3,629	119,117
	S.E.	1,261	1,598	303	926	908	884	651	4,262	343	373	5,054

APPENDIX B-4. STRAIT OF GEORGIA PINK CATCH SUMMARY, 1988.

Month		Statistical Area										
		13	14	15	16	17	18	19A	19B+	28	29	Total
Jan+Feb	Catch	0	0	0	0	0	0	0	0	0	0	0
	S.E.	0	0	0	0	0	0	0	0	0	0	0
March	Catch	0	2	0	0	0	0	0	0	0	0	2
	S.E.	0	3	0	0	0	0	0	0	0	0	3
April	Catch	0	5	0	0	0	0	0	0	0	0	5
	S.E.	0	7	0	0	0	0	0	0	0	0	7
May	Catch	157	263	7	4	0	0	0	0	0	0	431
	S.E.	58	124	5	6	0	0	0	0	0	0	137
June	Catch	1,375	848	22	188	292	0	0	0	5	27	2,757
	S.E.	280	158	8	61	76	0	0	0	3	11	336
July	Catch	789	837	33	26	69	0	0	0	34	38	1,826
	S.E.	130	227	14	19	31	0	0	0	20	17	266
August	Catch	2,307	954	60	86	22	0	0	56	0	16	3,501
	S.E.	397	355	19	34	16	0	0	33	0	10	535
September	Catch	123	43	0	0	0	0	0	0	2	4	172
	S.E.	69	29	0	0	0	0	0	0	3	4	75
October	Catch	0	9	20	120	0	0	0	0	0	0	149
	S.E.	0	10	21	130	0	0	0	0	0	0	132
Nov+Dec	Catch	0	0	0	0	0	0	0	0	0	0	0
	S.E.	0	0	0	0	0	0	0	0	0	0	0
Total	Catch	4,751	2,961	142	424	383	0	0	56	41	85	8,843
	S.E.	511	468	33	149	84	0	0	33	20	23	716

APPENDIX B-5. STRAIT OF GEORGIA SOCKEYE CATCH SUMMARY, 1988.

Month		Statistical Area 13	14	15	16	17	18	19A	19B+	28	29	Total
Jan+Feb	Catch	0	0	0	0	0	0	0	0	0	0	0
	S.E.	0	0	0	0	0	0	0	0	0	0	0
March	Catch	0	0	0	0	0	0	0	0	0	0	0
	S.E.	0	0	0	0	0	0	0	0	0	0	0
April	Catch	0	0	0	0	0	0	0	0	0	0	0
	S.E.	0	0	0	0	0	0	0	0	0	0	0
May	Catch	0	0	0	0	0	0	0	0	0	0	0
	S.E.	0	0	0	0	0	0	0	0	0	0	0
June	Catch	0	0	0	0	0	0	0	0	0	0	0
	S.E.	0	0	0	0	0	0	0	0	0	0	0
July	Catch	89	5	1	0	59	0	0	6,773	186	208	7,321
	S.E.	46	5	1	0	47	0	0	1,760	89	73	1,765
August	Catch	108	20	4	0	0	301	0	2,690	1,180	1,957	6,260
	S.E.	39	9	2	0	0	67	0	646	180	292	736
September	Catch	23	2	0	1	0	0	0	37	822	1,807	2,692
	S.E.	16	2	1	2	0	0	0	20	178	439	474
October	Catch	0	0	0	0	0	12	0	35	9	47	103
	S.E.	0	0	0	0	0	11	0	35	11	36	53
Nov+Dec	Catch	0	0	0	0	0	0	0	0	0	0	0
	S.E.	0	0	0	0	0	0	0	0	0	0	0
Total	Catch	220	27	5	1	59	313	0	9,535	2,197	4,019	16,376
	S.E.	62	10	2	2	47	68	0	1,875	269	533	1,971

APPENDIX B-6. STRAIT OF GEORGIA CHUM CATCH SUMMARY, 1988.

Month		Statistical Area										
		13	14	15	16	17	18	19A	19B+	28	29	Total
Jan+Feb	Catch	0	0	0	0	0	0	0	0	0	0	0
	S.E.	0	0	0	0	0	0	0	0	0	0	0
March	Catch	0	0	0	0	0	0	0	0	0	0	0
	S.E.	0	0	0	0	0	0	0	0	0	0	0
April	Catch	0	0	0	0	0	0	0	0	0	0	0
	S.E.	0	0	0	0	0	0	0	0	0	0	0
May	Catch	0	0	0	0	0	0	0	0	0	0	0
	S.E.	0	0	0	0	0	0	0	0	0	0	0
June	Catch	0	0	0	0	0	0	0	0	0	0	0
	S.E.	0	0	0	0	0	0	0	0	0	0	0
July	Catch	0	0	0	0	0	0	0	0	6	5	11
	S.E.	0	0	0	0	0	0	0	0	6	5	8
August	Catch	20	21	1	40	1	0	0	0	0	8	91
	S.E.	21	15	1	20	1	0	0	0	0	6	33
September	Catch	71	40	0	137	1	0	0	28	85	199	561
	S.E.	27	27	0	48	1	0	0	19	29	54	89
October	Catch	48	16	0	0	166	66	0	136	0	0	432
	S.E.	34	11	0	0	90	56	0	71	0	0	132
Nov+Dec	Catch	0	0	0	0	0	3,696	0	11	0	0	3,707
	S.E.	0	0	0	0	0	2,185	0	17	0	0	2,185
Total	Catch	139	77	1	177	168	3,762	0	175	91	212	4,802
	S.E.	48	33	1	52	90	2,186	0	75	30	55	2,191

APPENDIX B-7. STRAIT OF GEORGIA CATCH SUMMARY FOR TOTAL SALMONIDS, 1988. *

Month		Statistical Area 13	14	15	16	17	18	19A	19B+	28	29	Total
Jan+Feb	Catch	505	6,181	622	805	1,608	1,367	1,961	15,684	109	103	28,945
	S.E.	260	1,532	380	243	308	348	615	6,077	88	83	6,337
March	Catch	293	3,296	56	295	4,792	443	73	7,973	7	8	17,236
	S.E.	239	1,333	49	175	1,152	255	59	1,172	9	8	2,153
April	Catch	2,693	15,802	856	6,601	25,732	514	443	8,472	387	909	62,409
	S.E.	1,375	5,086	204	2,256	6,542	257	170	3,429	123	375	9,365
May	Catch	33,717	83,140	2,354	13,979	52,875	1,507	1,374	9,303	1,148	3,170	202,567
	S.E.	5,172	18,366	532	2,083	7,154	345	366	2,154	221	763	20,625
June	Catch	111,412	134,948	12,674	44,855	34,401	2,797	845	11,217	1,495	5,422	360,066
	S.E.	18,538	11,923	2,067	4,182	2,990	517	241	1,910	243	835	22,831
July	Catch	111,878	113,174	9,298	39,212	22,923	3,491	1,400	35,106	2,608	4,804	343,894
	S.E.	7,001	10,868	1,472	3,378	2,907	921	293	2,943	524	620	14,121
August	Catch	50,096	32,236	2,496	19,079	10,499	2,151	2,872	11,577	3,948	9,431	144,385
	S.E.	4,524	4,843	343	1,369	1,231	245	1,030	1,520	473	876	7,201
September	Catch	16,333	7,080	673	4,298	1,761	951	757	11,012	1,206	2,969	47,040
	S.E.	2,643	1,363	181	911	305	212	415	1,487	231	595	3,555
October	Catch	2,260	2,970	139	1,078	3,177	1,068	334	3,842	54	197	15,119
	S.E.	1,139	948	88	533	1,140	289	149	1,001	38	96	2,215
Nov+Dec	Catch	397	759	254	2,048	1,543	4,616	337	2,846	666	553	14,019
	S.E.	233	470	150	631	307	2,359	160	1,247	276	222	2,839
Total	Catch	329,584	399,586	29,422	132,250	159,311	18,905	10,396	117,032	11,628	27,566	1,235,680
	S.E.	21,219	25,574	2,663	6,466	10,761	2,691	1,403	8,608	872	1,730	36,824

* Includes coho, chinook, pink, chum, sockeye, steelhead and cutthroat trout.

APPENDIX B-8. STRAIT OF GEORGIA CATCH SUMMARY FOR RELEASED SALMON, 1988.

Month		Statistical Area										
		13	14	15	16	17	18	19A	19B+	28	29	Total
Jan+Feb	Catch	182	2,282	542	712	2,970	1,160	3,508	13,056	191	130	24,733
	S.E.	91	552	366	253	563	313	1,022	5,238	96	85	5,424
March	Catch	229	1,557	35	79	2,582	1,140	1,087	7,230	131	85	14,155
	S.E.	182	793	35	41	632	440	384	1,129	117	71	1,643
April	Catch	2,428	1,766	304	1,959	4,332	802	2,394	11,728	770	994	27,477
	S.E.	1,180	600	75	799	1,010	205	1,007	7,150	287	706	7,495
May	Catch	5,447	10,375	473	4,083	11,914	1,600	5,164	2,648	1,561	3,668	46,933
	S.E.	1,077	2,563	115	802	1,888	347	1,562	1,195	389	994	4,132
June	Catch	17,503	24,572	3,795	11,137	17,726	2,379	3,146	2,120	700	2,049	85,127
	S.E.	2,883	2,488	699	1,240	1,787	620	677	790	145	344	4,618
July	Catch	98,417	70,554	4,582	11,263	27,230	3,887	3,118	40,901	1,256	1,905	263,113
	S.E.	6,842	7,376	869	1,249	3,469	804	716	6,189	297	375	12,460
August	Catch	109,781	53,885	5,027	15,869	21,429	4,085	3,654	38,719	1,758	4,695	258,902
	S.E.	9,353	8,363	601	1,256	2,558	669	1,162	4,458	268	484	13,707
September	Catch	36,480	28,613	1,398	11,079	12,072	5,136	4,054	29,957	871	2,477	132,137
	S.E.	5,933	4,984	381	2,192	1,808	905	1,596	3,700	159	508	9,252
October	Catch	8,980	4,563	385	2,619	16,175	2,593	3,747	16,201	254	805	56,322
	S.E.	4,847	1,294	248	1,442	5,976	664	869	5,153	188	388	9,537
Nov+Dec	Catch	557	1,544	357	3,290	5,022	3,156	3,008	7,766	806	925	26,431
	S.E.	231	1,000	222	1,202	839	1,717	1,298	3,523	413	445	4,546
Total	Catch	280,004	199,711	16,898	62,090	121,452	25,938	32,880	170,326	8,298	17,733	935,330
	S.E.	14,281	12,881	1,419	3,788	8,171	2,478	3,457	13,882	818	1,612	25,828

APPENDIX B-9. STRAIT OF GEORGIA ROCKFISH CATCH SUMMARY, 1988.

Month		Statistical Area 13	14	15	16	17	18	19A	19B+	28	29	Total
Jan+Feb	Catch	11	11	50	61	955	246	540	601	22	9	2,506
	S.E.	13	16	58	40	182	91	204	246	23	17	387
March	Catch	125	0	0	0	439	111	284	841	435	418	2,653
	S.E.	117	0	0	0	141	82	162	250	261	290	530
April	Catch	517	26	56	1,291	2,527	1,137	474	701	332	124	7,185
	S.E.	311	13	39	595	691	236	331	295	245	73	1,117
May	Catch	1,240	1,817	274	6,243	2,302	1,074	1,360	5,807	150	233	20,500
	S.E.	286	1,109	121	1,394	596	430	534	1,513	65	92	2,529
June	Catch	2,214	2,761	306	5,078	5,877	2,083	607	3,413	802	2,012	25,153
	S.E.	483	386	80	853	731	438	173	776	182	402	1,634
July	Catch	7,386	11,355	569	11,714	9,566	6,269	1,230	8,277	2,611	3,667	62,644
	S.E.	781	1,838	109	1,678	1,771	2,324	419	1,265	636	789	4,261
August	Catch	9,802	10,905	1,172	8,938	4,635	1,699	1,516	3,883	944	2,619	46,113
	S.E.	1,129	2,322	182	852	866	391	742	694	198	374	3,089
September	Catch	2,051	2,471	257	3,491	950	1,466	73	1,065	407	883	13,114
	S.E.	408	630	88	722	214	407	90	201	117	237	1,193
October	Catch	1,065	689	73	1,003	2,123	1,689	159	2,617	160	473	10,051
	S.E.	366	309	67	639	820	510	110	630	113	245	1,434
Nov+Dec	Catch	316	0	27	358	1,086	1,351	49	1,435	90	104	4,816
	S.E.	262	0	18	201	246	812	38	765	99	57	1,195
Total	Catch	24,727	30,035	2,784	38,177	30,460	17,125	6,292	28,640	5,953	10,542	194,735
	S.E.	1,637	3,262	289	2,746	2,467	2,662	1,114	2,491	804	1,068	6,584

APPENDIX B-10. STRAIT OF GEORGIA LINGCOD CATCH SUMMARY, 1988.

Month		Statistical Area											
		13	14	15	16	17	18	19A	19B+	28	29	Total	
Jan+Feb	Catch	0	0	0	0	0	0	12	26	14	6	58	*
	S.E.	0	0	0	0	0	0	10	23	13	10	30	
March	Catch	0	0	0	0	0	0	0	71	0	0	71	*
	S.E.	0	0	0	0	0	0	0	41	0	0	41	
April	Catch	0	1	4	6	11	260	164	700	97	74	1,317	
	S.E.	0	1	4	5	12	81	110	423	52	36	449	
May	Catch	1,178	760	47	2,660	1,371	310	117	1,628	61	198	8,330	
	S.E.	235	373	18	583	378	142	66	570	27	93	1,018	
June	Catch	4,046	2,480	146	1,187	1,244	598	154	1,621	163	402	12,041	
	S.E.	834	353	35	207	186	150	60	361	45	89	1,032	
July	Catch	8,596	3,645	424	2,029	826	1,523	125	1,518	170	374	19,230	
	S.E.	890	598	115	284	173	454	54	227	57	84	1,243	
August	Catch	6,897	3,695	542	2,122	1,028	120	60	1,134	107	390	16,095	
	S.E.	765	928	93	220	234	39	42	231	30	64	1,273	
September	Catch	1,599	635	93	530	190	233	43	1,029	68	132	4,552	
	S.E.	359	191	40	118	66	71	49	177	21	39	475	
October	Catch	264	324	29	1,190	800	314	0	562	21	61	3,565	
	S.E.	162	174	26	530	454	115	0	202	19	41	775	
Nov+Dec	Catch	0	0	0	78	326	121	0	59	26	60	670	*
	S.E.	0	0	0	71	136	112	0	41	27	47	202	
Total	Catch	22,580	11,540	1,285	9,802	5,796	3,479	675	8,348	727	1,697	65,929	
	S.E.	1,511	1,245	160	901	701	536	165	903	106	186	2,517	

* A total closure for lingcod was in effect from January 1 to April 15, and November 15 to December 31, 1988; see Table 3 footnote.

APPENDIX B-11. STRAIT OF GEORGIA DOGFISH CATCH SUMMARY, 1988.

Month		Statistical Area 13	14	15	16	17	18	19A	19B+	28	29	Total
Jan+Feb	Catch	78	0	0	0	0	0	0	0	0	0	78
	S.E.	54	0	0	0	0	0	0	0	0	0	54
March	Catch	0	0	0	0	0	0	0	5	0	0	5
	S.E.	0	0	0	0	0	0	0	9	0	0	9
April	Catch	0	0	0	0	0	0	0	0	0	0	0
	S.E.	0	0	0	0	0	0	0	0	0	0	0
May	Catch	36	18	0	248	51	7	0	0	23	37	420
	S.E.	23	19	0	120	34	6	0	0	14	23	131
June	Catch	54	32	11	39	46	67	0	156	128	266	799
	S.E.	23	11	7	18	26	44	0	94	47	94	153
July	Catch	40	6	5	14	40	171	0	109	224	827	1,436
	S.E.	31	7	2	7	28	59	0	62	116	103	182
August	Catch	98	58	4	7	94	17	85	104	125	182	774
	S.E.	49	35	3	5	55	16	95	63	47	68	164
September	Catch	28	98	0	13	1	0	41	0	17	42	240
	S.E.	17	44	0	13	1	0	61	0	11	23	82
October	Catch	0	0	0	0	0	2	0	21	15	45	83
	S.E.	0	0	0	0	0	2	0	27	16	33	46
Nov+Dec	Catch	0	0	0	0	0	110	0	0	90	79	279
	S.E.	0	0	0	0	0	112	0	0	74	74	153
Total	Catch	334	212	20	321	232	374	126	395	622	1,478	4,114
	S.E.	87	61	8	122	75	135	113	132	155	178	369

APPENDIX B-12. STRAIT OF GEORGIA CATCH SUMMARY FOR OTHER FINFISH, 1988.

Month		Statistical Area										
		13	14	15	16	17	18	19A	19B+	28	29	Total
Jan+Feb	Catch	0	5	1	30	273	732	242	182	14	85	1,564
	S.E.	0	7	1	23	165	250	105	100	13	91	346
March	Catch	334	12	0	0	320	88	0	3,261	13	20	4,048
	S.E.	235	13	0	0	153	66	0	1,190	11	19	1,225
April	Catch	0	1	2	4	3,847	986	152	440	70	206	5,708
	S.E.	0	1	2	5	2,154	439	265	477	43	134	2,269
May	Catch	123	172	18	246	2,198	667	264	1,966	156	268	6,078
	S.E.	49	97	10	62	1,451	325	239	726	58	101	1,681
June	Catch	659	1,221	75	1,714	2,345	1,514	295	1,212	346	821	10,202
	S.E.	165	267	35	585	1,288	889	188	340	91	191	1,757
July	Catch	3,007	2,170	204	1,934	292	4,042	690	2,194	2,261	2,315	19,109
	S.E.	355	397	41	324	70	2,340	357	439	745	816	2,722
August	Catch	2,091	1,656	136	880	851	361	1,185	810	695	1,219	9,884
	S.E.	348	399	34	157	186	215	1,158	193	168	266	1,365
September	Catch	125	636	25	564	141	275	770	689	200	369	3,794
	S.E.	41	192	10	154	52	115	854	186	69	117	928
October	Catch	190	163	5	28	455	1,288	307	1,048	197	578	4,259
	S.E.	126	82	7	25	196	783	254	492	156	339	1,059
Nov+Dec	Catch	0	11	65	292	410	4,095	854	400	132	140	6,399
	S.E.	0	13	44	116	153	2,930	468	238	93	74	2,986
Total	Catch	6,529	6,047	531	5,692	11,132	14,048	4,759	12,202	4,084	6,021	71,045
	S.E.	591	664	79	717	2,926	3,986	1,629	1,691	797	972	5,732

APPENDIX C. STRAIT OF GEORGIA CREEL SURVEY STUDY AREA.

The Strait of Georgia Creel Survey study area includes those waters of Juan de Fuca Strait and the Strait of Georgia bounded in the south by a line from Sheringham Pt. on Vancouver Island due south to an intersection with the International Boundary and along the International Boundary to the B.C. Mainland coast at Blaine (Boundary Bay) and in the north by the following 3 boundary lines:

1) in discovery passage from Granite Pt. on Quadra Island to the stream mouth west of Moriarity Pt. on Vancouver Island.

2) in Okisollo Channel from Granite Pt. on Quadra Island due north to Sonora Island.

3) in Cordero Channel from Burnt Bluff on the mainland 214° passing west of Dent Island to Sonora Island.

The area for which the Strait of Georgia Creel Survey statistics apply includes the above listed administrative area with the exception of the following areas:

1) Bute Inlet above a line from Lawrence Pt. running across the inlet. This area coincides with management units 13-21 and 13-22.

2) Waters of Pryce Channel, Waddington Channel, Pendrell Sound, Homfray Channel and Toba Inlet bounded by a line drawn from Horace Head on East Redonda Island at the south end of Waddington Channel to the northern point of Roscoe Bay on West Redonda Island and a line drawn within Homfray Channel from Price Pt. on the eastern shore of the channel by a line drawn from George Head at the easterly entrance of Ramsay Arm to Sutil Pt. on Cortes Island.

3) Hotham Sound above a line drawn from Elephant Point on the western shore of the Sound to the southern point of Granville Bay on the eastern shore of the Sound.

4) Jervis Inlet above a line drawn within Prince of Whales Reach from the mouth of Treat Creek on the east shore across the Reach to the summit (1625') at the head of Goliath Bay.

5) Sechelt Inlet including Narrows Inlet and Salmon Inlet above a line drawn within Skookumchuck Narrows from the "dog-leg" point southeast of the Egmont Pt. 224° across the Narrows to Sechelt Peninsula.

APPENDIX D. SPECIES COMMONLY INCLUDED WITH OTHER FINFISH.

Pacific Herring
Pacific Cod
Pacific Tomcod
Walleye Pollock
Pacific Hake
Perches - any perch, seaperch or surfperch
Greenlings
Flounders - Pacific Halibut, any flounder or sole